Driving Transformational Change Through Novel Microfinance Deployment Structures

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Honor Statement

On my honor as a student, I have neither given nor received unauthorized aid on this assignment

Disclaimer

The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other agency.

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Key Acronyms and Definitions

BCR: Benefit Cost Ratio

FMCGs: Fast-Moving Consumer Goods

FSPs: Financial Service Providers

GDP: Gross Domestic Product

MFIs: Microfinance Institutions

NBFI: Non-Banking Financial Institutions

NGO: Non-Governmental Organizations

NPV: Net Present Value

RCT: Randomized Control Trial

SCF: Supply Chain Financing

SME: Small or Medium Sized Enterprises – such enterprises are typically larger than microenterprises

TMF: Traditional Microfinance

IBRD: International Bank for Reconstruction and Development

IDA: International Development Association

IFC: International Finance Corporation

WBG: World Bank Group

Graduate Borrowers: Borrowers that have successfully borrowed and repaid a line of credit in the past. Such borrowers are associated with lower levels of risk of default due to the establishment of a formal credit history.

Gung-Ho Entrepreneurs: Households who were already running a business before microfinance was introduced into the business's capital structure.

Microcredit: A manifestation of microfinance that focuses on debt and loan delivery to low-income and impoverished people.

Microfinance: The provision of formal financial services to low-income and impoverished people who have been systematically excluded from common financial systems.

Executive Summary

Microfinance, specifically in the form of credit delivery or microcredit, has served as the epitome and face of global developmental finance. Despite such laudation, evidence has suggested that its use often fails to motivate broad transformational change. As such, this report aims to explore novel mechanisms that fulfill traditional microfinance mandates, serve vulnerable populations, and address the failures of existing deployment structures to attain institutional goals of driving broad transformational change. If development banks and other multilateral institutions can understand novel implementations of microcredit, they may effectively drive transformational change in vulnerable communities. Such change can prevent the exploitation of borrowers, improve the lives of women and children, and allow for well-meaning initiatives to have a strong positive impact. This report seeks to comparatively analyze:

1. **Traditional Microfinance:** Lending uncollateralized capital to individual microentrepreneurs with limited checks on capital usage and either rigid or flexible repayment schedules. Such lending is often associated with a high coupon and short repayment schedules.
2. **Supply Chain Microfinance:** Lending capital collateralized by a borrower's operational inputs (inventory and raw materials). Lenders can coordinate with a borrower's supplier to overcome information asymmetry barriers, resulting in a significant reduction in risk and creating optionality for a reduced coupon.
3. **Asset-Based Microfinance:** Lending capital collateralized by a new machine or tool purchased by the borrower. This alternative is similar to our colloquial experience of a car loan and allows for higher levels of capital deployment with equivalent or reduced risk to the issuing MFI.

These alternatives are analyzed through a framework that evaluates the mechanism on several criteria, including **1)** The impact on business outcomes and cost-effectiveness, **2)** The impact on household outcomes, **3)** The expansion of impact across a heterogeneous borrower population, and **4)** The financial viability for MFIs and multilateral development banks.

A preliminary analysis that leverages existing literature in the space suggests that traditional microfinance structures should be progressively replaced with asset-based microfinance structures. This report is, however, limited by the lack of significant research on the Supply Chain Microfinance alternative. To rigorously recommend an optimal alternative for addressing the problems of traditional microfinance structures, an empirically robust study would need to be conducted. Such an RCT would directly compare the impacts of Traditional Microfinance, Flexible Repayment Microfinance, Supply Chain Microfinance, and Asset-Based Microfinance across a homogenous sample population.

Problem Definition and Client Interest

Despite a sharp rise in the focus on microfinance as a mechanism for driving global development, critics have demonstrated that its use fails to motivate broad transformational change (Breza & Karlan, 2023). The majority of evidence suggests that due to facets such as credit structures and borrower heterogeneity, existing microcredit mechanisms often fail to create a transformational impact in the majority of microenterprises (Cai, J., Meki, M., & Quinn, S., 2023; Crépon, Komi, & Osman, 2023). ***Recent analysis has indicated that for the average household with no business experience, microfinance most commonly has zero effect on outcomes (Meager, R., 2019). Prolonged failure will have lasting consequences, resulting in unfulfilled goals of ending extreme poverty, improving access to education & food security for women and children, and boosting the prosperity & stabilization of regional and global economies.*** As such, multilateral development institutions must explore novel mechanisms that fulfill traditional microfinance mandates, serve vulnerable populations, and address the failures of existing deployment structures to attain their institutional goals of driving broad transformational change.

Client Interest: Dr. Nistha Sinha serves as a global lead for the World Bank's Global Solutions Group on Markets & Institutions. This team advises groups within the World Bank and outside of the World Bank on the best methodologies and approaches to driving transformational change in the development space. These recommendations

consist of novel uses of capital as part of ideas for addressing failures in key markets and market institutions, and the sharing of resources and evidence from studies undertaken by the group on novel mechanisms. These outcomes are commonly measured by changes in business and household financial outcomes. As a result of significant literature pointing out the failure of microcredit to drive broad transformational change, the client is interested in comparing traditional mechanisms of microfinance with supply chain and asset-based microfinance. Both supply chain microfinance and asset-based microfinance are associated with reductions in risk to the lender, as well as allow for collateralization of leverage (Shrivastava, 2022). The client is interested in using the final technical report as a launching point for a directed study in supply chain and asset-based microfinance.

The State of Microfinance Investment

The governance map in **Appendix 1** outlines how different institutions take a role in the deployment of microfinance and capital-intensive global development. The map shows the flow of capital from a variety of sources to intermediaries and investment managers, and finally to the small business that will receive the capital in the form of a microfinance investment. Small businesses – often producers of consumer goods – receive capital from Microfinance Institutions (MFIs). MFIs can take the form of a nonprofit (often an NGO), mutual fund, or commercial company (either a bank or a non-banking financial institution (NBFI)) (How Does an MFI Work, 2016). These organizations commonly seek to invest capital with a double bottom-line mandate – a strategy combining financial profit with social responsibility (Double Bottom Line, 2022). When microenterprises do well, they can grow and pay back the line of credit received from MFIs. MFIs receive a return on their capital through repayment of the debt's principal along with generated interest.

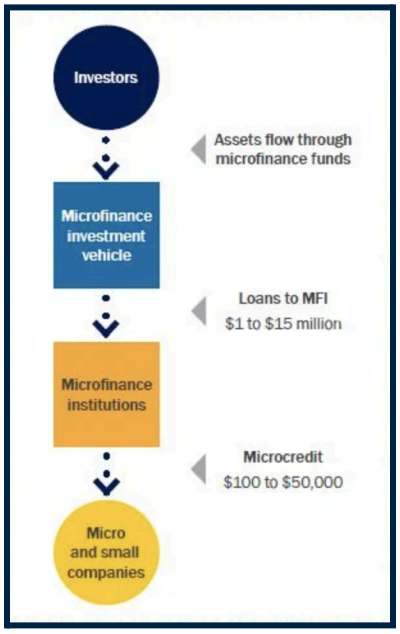

Figure 1: Flow of Microfinance Capital (Wealth, 2020)

MFIs act as a hub for many different spokes of investment capital and may receive capital either as an investment or as a contribution from governments (local or national), NGOs, foreign governments, private foreign investors (FDIs), and multilateral institutions such as the United Nations, World Bank, USAID, and IFC. These parties have varied investment mandates and are along the entire risk-return continuum. Such mandates inform the approach of MFIs in deciding how much to lend, to whom to lend, and other investment considerations. Local governments and NGOs can also interact with small enterprises directly. Such interaction may take the form of capital investment, formalized training, technical assistance, and general or advisory support. In addition to capital and investment, multilateral institutions like the World Bank Group may provide grants or loans to governments that are to be used to inject funds into MFIs. Organizations such as the IFC also provide capital or advisory services.

Evidence for the Failure of Traditional Microfinance Structures

While there has been a large amount of focus and suggestive evidence for the overall success of microinvestment, recent literature has indicated that existing microfinance credit delivery mechanisms do not appear to broadly alleviate poverty. Further, such literature illustrates that microfinance may even be doing more harm than good for the poorest of borrowers (Karnani, A., 2007). The impacts of traditional microfinance remain debated and the potential negative outcomes of its deployment have been contested – studies that look to understand the failures of microfinance provide evidence that the situation may not be as severe as critics fear. These studies confirm the lack of impact associated with microfinance for the average borrower but indicate that the exacerbation of poverty is an uncommon result of its use (Osmani, S. R., 2017).

There are a few accounts as to why microfinance seems to be failing. Failed transformational change from microfinance delivery has been attributed to credit mechanism limitations and borrower heterogeneity. In **Appendix 2**, I outline a root cause analysis of the issue. In essence, common literature attributes the failure of microfinance and its inability to drive broad transformational change to both Credit and Delivery Structures and to Borrower Heterogeneity. Addressing these driving factors has been a major focus for many investors, academics, and institutions in the development space.

Credit and Delivery Structures describe how capital is delivered and used by a borrower, whether capital is collateralized, and determine the cost of debt that the borrower assumes. Much of the variation within this category can be found in comparing various credit and lending agreements in the microfinance space. Within this, the failure of micro-investment is considered to be the product of:

- ***Burdensome Pricing:*** Microfinance loans are priced significantly higher than the standard business loan and can range from 15 to 36 percent p.a. This price often depends on whether the currency denomination of the loan is local or in USD (Heng, D., Chea, S., & Heng, B., 2021; Karnani, A., 2007). Such pricing can

result in borrowers being encumbered by the cost of debt and in some cases may even result in worsened outcomes for borrowers due to the creation of a cyclical ‘debt trap’ (Jahiruddin, A., Short, P., Dressler, W., & Khan, M. A., 2011).

- ***Inflexible Repayment Schedules:*** Microfinance loans can have a limited impact on measured outcomes and be burdensome to borrowers as a result of the fast turnaround of credit agreements. These agreements often include maturities as short as three to six months with repayment installments due on a weekly or monthly basis (Liman, N., Hashim, M. K., & Arshad, D., 2016).
- ***Over or Underlimitation of Capital Usage Guidelines:*** Much debate exists on the value of mandating microfinance capital be directed in its use rather than being structured as a free-use mechanism. Some mechanisms that have been developed to better understand this dynamic and to address potential failures within credit structures include in-kind and asset-based deployment structures. These structures require borrowers to use lent capital specifically for pre-outlined operational investments. The idea behind this approach is based on utility models that identify that “smart” use of capital can maximize utility derived from its receipt.

Pricing and repayment structures are common across all applications of debt investment; however, within microfinance investment, these structures can be made burdensome as the result of a lender’s (MFI’s) reasonable assumption that a microinvestment is risky by nature. This results in an antergy with the lender’s mandate for a risk-adjusted market-like return (Understanding, 2023). Within credit, two factors that can directly influence a lender to believe that an investment may be high in risk are the lack of creditworthiness data on the lendee (information asymmetry) and the lack of collateral for the investment from the lendee’s business. In addressing these issues, investors may understand a given microinvestment as being lower in risk and as such can extend capital with more flexible repayment schedules and lower pricing. ***Addressing the failures associated with Credit and Delivery structures would be considered successful if the impact of microfinance on business and household outcomes is increased and widened across a population of borrowers.***

Borrower Heterogeneity analysis is a second framework developed to understand the failure of development investments. This model has recently gained much attention and is understood as existing microfinance structures successfully impacting a specific subset of borrowers while not successfully impacting the remainder of the borrowers. Here, much literature indicates that individuals who are male, “gung ho” in nature, and have experience with enterprise development are significantly more likely to see transformational impacts from credit investment than entrepreneurs of other demographic groups (Banerjee, A., Breza, E., Duflo, E., & Kinnan, C., 2019; Breza, E., & Karlan, D., 2023; Cai, J., Meki, M., & Quinn, S., 2023; Khan J. I., & Simpson, W., 2017). Within this framework, it has been understood that the remaining subsets of borrowers are unlikely to benefit from traditional microfinance structures – even if major changes to credit and delivery structures were to occur – unless such structural changes focus on addressing the heterogeneous impact of structures across borrowers. Evidence of this heterogeneous effect is rigorous and well-researched and has been documented to hold across a variety of demographics and investment categories – microloans, loan payments in kind, cash grants, and equipment grants (Crépon, Komi, & Osman, 2023).

Scope of the Technical Report: I will be focusing my alternative analysis on two specific variations of Credit and Delivery Structures. There are a few reasons for this decision. Addressing both of the aforementioned drivers for the failure of microfinance would result in too broad of analysis, especially as I do not limit my analysis geographically. I avoid geographic limitations due to the availability of literature in the space and because the findings of the report should be broadly applicable. Further, existing alternatives tend to specifically address one of the two aspects of failure, not both simultaneously. By focusing on credit and delivery structures and not on borrower heterogeneity, I can more effectively compare alternatives. This constraint is designed to provide value to the client and other development institutions as it focuses on where innovation can make a difference. While borrower characteristics are a factor in credit success, the fundamental challenge for deploying microfinance in developing countries

is how one can deliver capital to microentrepreneurs. It should be noted that alternatives focused on either factor can be evaluated on the same criteria.

Evidence for the Success of Existing Microfinance Structures

Despite the broad literature that demonstrates the limited impact of microfinance on the majority of borrowers, the transformational impact witnessed by the subset of borrowers who experience heterogeneous benefits is significant. Bruhn, M., & Love, I. (2014) look at the impact of sudden improved access to finance for low-income communities in Mexico. Here they analyzed the introduction of a bank that functioned and served similar populations as an MFI and its impact on the financial outcomes of borrowers. They found that the opening of the bank led to a 7.6% increase in the proportion of informal business, without any change in the level of formal business activity. Further, Bruhn and Love found that the creation of the bank led to an average 7% increase in income levels for previous informal business owners within the study over two years (business owners who partook in informal business activities before the introduction of the bank). The authors pointed to previous research that both supported (Burgess, & Pande, 2005) and cast doubt on their findings (Panagariya, A., 2006). Burgess & Pande found the expansion of bank branches in rural India to have a significant positive impact on reducing local poverty levels. Panagariya provided critiques of this same India study. Bruhn and Love address these critiques within their analysis, arguing that such limitations have been properly accounted for. Third, Bruhn and Love found that the creation of the bank led to a 1.4% reduction in the proportion of unemployed individuals and increased the income of this group. Beyond Bruhn and Love, a variety of other literature has also demonstrated traditional microfinance's ability to drive change in a subset of borrowers (Benti, B. B., 2019; Crépon, B., Komi, M., & Osman, A., 2023; Subir Bairagi, & Wasel Shadat., 2016). This literature outlines the incredible value that microfinance could have if its effects were more standardized across the spectrum of borrowers.

One space where the use of traditional microfinance is interesting is in the overcoming of poverty traps. Banerjee, A., Breza, E., Duflo, E., & Kinnan, C. (2019) in a study based

in Hyderabad, India, find that for those who can leverage microfinance successfully, microfinance can allow borrowers to overcome poverty traps – major efficiency hindrances associated with lumpy investment requirements. Lumpy investments can be thought of as large expenditures of capital for the purchase of equipment, or other reasons, that can not be installed in a piecewise manner. The inability of borrowers to collect the necessary capital to invest in a lumpy investment is a primary barrier to socioeconomic mobility for microentrepreneurs. Overcoming a poverty trap often results in gaining access to tools that are generally available to the majority of enterprises, whereas failing to overcome a poverty trap forces microenterprises to use tools that are much less productive than the tools that are standardly available in the market. In the study, the researchers found that the use of microfinance was both life-changing and socially significant in terms of magnitude. The authors attributed this change in outcomes to the credit's ability to enable enterprises to invest in more productive technologies that were previously inaccessible due to the poverty trap. The remainder of the impact comes from the ability to scale after being enabled by new technologies.

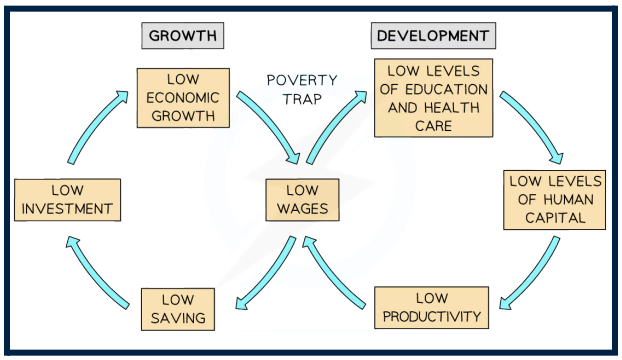

Figure 2: Poverty Trap Cycle (Introduction to Economic, 2015)

Analyzing an MFI's ability to function profitably without being exploitive of borrowers is important. Some RCT evidence suggests that this is possible with one Sri Lankan study suggesting an average return on capital of ~5.7% a month for borrowers. This return outpaces the majority of microfinance market interest rates necessary for MFIs to maintain operations or profit from investment (De, S., David, M., & Woodruff, M., 2007). In expanding on the cost-effectiveness of MFIs – and tangentially the ability of MFIs to function without raising borrower interest rates, Caudill, S. B., Gropper, D. M., & Hartarska, V. (2009) leveraged a unique database on MFIs operating in Eastern Europe and Central Asia, finding that MFIs that move from external subsidy reliance to deposit reliance have been successful in maintaining impact levels while becoming more

cost-effective. Alternatively, however, MFIs within networks and MFIs that remain reliant on subsidies appear to either maintain or deteriorate in terms of cost-effectiveness. Such research may inform optimal pathways in structuring MFIs, the deployment of development capital, and the services provided to microenterprises.

Contextualizing Failure

Addressing the failure of microfinance and its falling short of generating broad transformational change is important for both society and development initiatives. If development banks and other multilateral institutions can understand novel implementations of microcapital, they may be able to effectively drive transformational change in vulnerable communities. Such change prevents the exploitation of borrowers, improves the lives of women and children, and allows for well-meaning initiatives to have a strong positive impact. By compounding improvements that address both borrower heterogeneity and mechanism structures, development institutions can address historic failures in fulfilling their mission and move towards greater success. If either supply chain or asset-based microfinancing is found to be more effective than traditional microfinance mechanisms, development banks may be able to leverage their effectiveness in fulfilling this mission.

Literature Review

Minor Adjustments to Traditional Models

Before analyzing mechanisms that are fundamentally different from current implementations of microfinance, I first look at minor adaptations of the traditional model that have shown both success and failure. The existing framework of microcredit manifests as a cash loan with a fixed interest rate and repayment schedule. This loan is provided to a single enterprise with limited to no stipulations on capital usage. An early adjustment to the microfinance delivery model was the concept of group lending. This structure relied on theoretical models that indicated that joint liability would mitigate against adverse selection and moral hazards for MFIs. These models focussed on the adjustment's ability to leverage peer screening, monitoring, and enforcement mechanisms that exploit information access. Recent empirical evidence has contradicted these findings, suggesting that the use of group lending models has no significant impact on the repayment and default rates of borrowers, indicating that even without joint liability, social pressures were sufficient in incentivizing repayment (Giné, X., & Karlan, D., 2014).

Another adjustment to the traditional structure is the flexible repayment model. This approach has garnered significant attention as literature has suggested that such models carry no negative impact on lenders as they do not vary with traditional models in default and late payment rates. Such models, however, appear to generate significant welfare gains in comparison to traditional models due to the introduction of flexible microcredit (Subir Bairagi, & Wasel Shadat, 2016). Researchers found that, in Bangladesh, such models were associated with a benefit-cost ratio of 1.93 and 2.60 times, whereas the BCR of traditional microcredit was between 1.31 and 2.09. If this model does indeed improve borrower outcomes without adversely impacting lenders, it could be an interesting mechanism, especially when combined with more radical changes in lending structures. These findings have been supported by similar work in the space that provides a meta-analysis of a variety of literature pertaining to microfinance (Cai, J., Meki, M., & Quinn, S., 2023). Other minor adjustments to the standard model include dynamic incentive and demographic target models, as well as

loan repayment schedules that accommodate a given sector – such as in a model that accommodates the harvest season, adjusting for how seasonality may impact the ability of agricultural firms to repay debt.

The Importance of Having Insight into Creditworthiness

To understand the value-add associated with supply chain financing, it is important to realize the value that creditworthiness data has in addressing information asymmetry in microenterprise credit agreements. Microfinance borrowers often exist and act within an informal economy. As such, there is often a dearth of government or credit bureau data that can be leveraged to determine a borrower's creditworthiness. Because of this, much focus has been allocated to seeking instruments, that may be more readily accessible to marginalized groups in developing economies, that can serve as a mechanism of evaluating creditworthiness. One recent study on a South American telecom has demonstrated the potential of leveraging phone usage data as an instrument of creditworthiness and the likelihood of default or delayed repayment. This study found that the riskiest quintile of borrowers was 2.8 times more likely to default than the least risky quintile of borrowers (Björkegren, D., & Grissen, D., 2019). These borrowers, without an instrument of creditworthiness, would have otherwise been very difficult to distinguish by the lender.

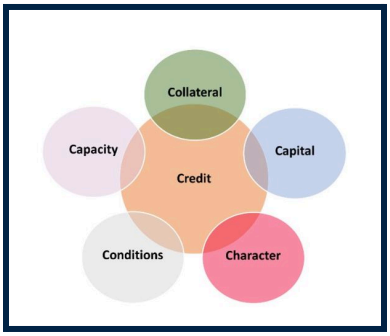

Figure 3: Credit Evaluation (Are you Creditworthy, 2020)

Supply Chain Microfinance: A Theoretical Analysis

It is first important to understand what supply chain microfinance would look like when tailored to the enterprise landscape of emerging economies. Supply chain financing is a term used for a broad class of financial arrangements; however, within the application of microfinance, it likely manifests as a payables/receivables purchase-based product. While SCF has been tried and tested in the SME space with a demonstrated positive effect on increasing SME outcomes, its utilization has been underdeveloped in emerging markets despite obvious use cases (Supply Chain Finance Knowledge Guide,

Figure 4: Supply Chain Finance in Concept (Shrivastava, P., Punatar, P., & Stefanski, S., 2019)

2019; IFC, 2021). **Figure 4** outlines a case of this mechanism in use.

Supply chain financing structures can fulfill and overcome working capital needs and bottlenecks allowing for faster inventory turnover and an increase in sales (Botta, A., Höll, R., Jain, R., Shah, N., & Tan, L., 2020). In this structure, MFIs are able to leverage a supplier's transaction history with a specific microenterprise as an instrument of that microenterprise's creditworthiness, which, when paired with the collateralization of inventory underwritten, allows for significant risk reduction to the lender. A recent study of the mechanism in use with Unilever and Mastercard in Kenya indicated preliminary success with participating merchants seeing a 20% growth in same-store sales (SSS) (Better than Cash Alliance, 2018). The study does not appear to be rigorous enough to establish causality; however, it provides sufficient evidence to support further exploration. In this vein, Stefanski, S. (2020) found that SCF helps with the movement of goods through an economy and can support the connectedness of a market. Similarly, another study in Ghana, Ethiopia, and Nigeria found that SCF, at the SME level, facilitated business operations and cash flow management resulting in higher sales, turnover, and increased profitability and growth (Shrivastava, P., 2022). Literature in support of SCF is evident and highly encouraging, however, additional studies are necessary to test the robustness of these outcomes. Further studies that are focussed on the microfinance space will be needed to better understand the viability of the mechanism in scale and how broad of a use case it provides.

SCF is unique in that it provides multilateral benefits. SCF allows microenterprises (lendees), MFIs (lenders), suppliers, and fast-turnover consumer goods companies to achieve increased financial gains. Microenterprises can receive a turn of collateralized inventory on credit. This allows for the increase in capacity and sales as well as the

mitigation of being encumbered by pricing due to lower investment risks. Further, this model not only allows for repayment flexibility but is built on offering the borrower such flexibility as the repayment schedule of the loan is tailored to a given microenterprise's operational capacity. Suppliers of inputs and raw materials are incentivized within the model as it allows for more of their products to be purchased. Lenders can benefit from reduced risks and costs allowing them to cater to new markets (Chhabra, P., Wilson, J. M., Degenhart, E., Martinez, P., 2021; Shrivastava, P., Punatar, P., & Stefanski, S., 2019).

Asset-Based Microfinance

Asset-based microfinance is a second novel mechanism that has received significant attention, especially when paired with credit and loan structures (Khanna, V., Korn, A., & Mellia, C., 2023). Functionally, asset-based finance works similarly to our common experience of a home mortgage. A business identifies a tool that is out of its budget but necessary for expansion and borrows money to purchase the tool. The microenterprise pays an equity downpayment to purchase the tool and then pays towards both interest and principal over the following months until they own the tool in its entirety (slowly replaces debut with equity). The theory behind this mechanism relates to the benefits of overcoming poverty traps and lumpy investment barriers, allowing for a microenterprise to pay for equipment in a more accessible piecewise manner. Literature in this space that directly focuses on asset-based investment through a credit structure at the microenterprise level is sparse with two main studies published (Bari, F., Meki, M., Malik, K. Z., & Quinn, S., 2021; Jack, W., Kremer, M., Joost de Laat, & Suri, T., 2023). Both studies focus on underwriting a tool or machine needed by a microenterprise that would normally be unobtainable due to price. Bari et al. (2023) conducted a field experiment that looked at asset-based lending in Pakistan. In this study, researchers structured a credit agreement in the following manner: The borrower pays for 10% equity upfront. Following this, the borrower pays 5% monthly towards the equity plus 1% monthly "rent" or interest. At the 18-month mark, the borrower will have entirely owned the machine in question. This study found a significant impact on business outcomes, with profit growth averaging over 8% a month, household consumption increasing on

average 6% a month, and loan default remaining under 5%. This paper randomly assigned people to two different implementations of the mechanism with flexible and ridged repayment structures. Flexible vs ridged repayment structures vary in their allowance of when borrowers are responsible for paying down the principal or generated interest of a credit facility. While the difference in outcomes between the two treatment groups was small, the implicit insurance of the flexible repayment schedule appeared to be valuable for risk-averse microenterprises. This suggests that the introduction of flexible repayment structures can widen the positive impact of an investment mechanism across a broader range of borrowers. Asset-based microfinance is inherently collateralized, making it more viable for lenders to extend larger loans to credit-constrained borrowers without a higher level of risk relative to traditional microfinance (Jack, W., Kremer, M., Joost de Laat, & Suri, T., 2023). Jack, et al. (2023 conducted a similar study in rural Kenya. Here the researchers studied the potential for asset collateralization to expand access to credit. The study found that asset-based loans had a real impact on financial measures, investment amounts, and educational outcomes.

While these are the only researched implementations of asset-based lending that are directly applicable to microcredit applications, there are a few other models that may provide insight into the space and the potential success of the mechanism. Bassi, V., Muoio, R., Porzio, T., Sen, R., & Esau T. (2021), in their study of manufacturing firms in Uganda, found that rental markets of machines allow for microenterprises to achieve scale collectively and mechanize. This mechanization was associated with several benefits, including higher revenue per worker, and higher output capacity of a microenterprise. In turn, this increase in capacity could be leveraged by machine owners so that they could rent out the machine to other local microenterprises. By renting rather than buying a tool, microenterprises could bypass the lumpy investment requirements necessary to normally gain access to the mechanism. Another interesting model that may provide insight into the value of asset-based microfinance is the analysis and use of maker spaces, in developing economies, as a catalyst for entrepreneurship, capacity expansion, and innovation. Van Holm, E J. (2015) found that

maker spaces within and outside the United States generated dense networks that allow for the creation of new ideas and innovative thinking, as well as lowered costs for prototyping. Like in the rental market model, maker spaces allow microentrepreneurs to utilize tools that are not normally within reach. By being responsible for the cost of entry into a maker space rather than the upfront cost of purchasing the tools within a maker space, microenterprises are again able to bypass the lumpy capital requirements of the equipment market. While neither the rental market nor the maker space model directly informs the success of asset-based microlending, they provide insight into the benefits of shared ownership or partial payment for access to a business-expanding tool. Access to these tools allows microenterprises to overcome poverty traps associated with a lack of access to capital needed to purchase the tools outright and prevent microenterprises from being limited by low-efficiency machinery that is available in the markets in which they exist (Banerjee, A., Breza, E., Duflo, E., & Kinnan, C., 2019).

Finally, another Uganda-based study that may inform the structure and potential success of both supply chain and asset-based microfinance was conducted in 2022 by Kaboski, J. P., Lipscomb, M., Virgiliu Midrigan, & Pelnik, C. This study developed the notion that for an investment to drive growth within a microenterprise, the input or tool purchased with credit should have a high elasticity of supply. If a microenterprise borrows capital to purchase something inelastic in supply, the acquisition will likely not lead to growth for the microenterprise. Instead, the acquisition may even harm the local informal economy by increasing the price of the product within the closed market for other microenterprises. The study suggests that any capital deployment mechanism should focus on underwriting products that have a high elasticity of supply.

Evaluative Criteria

The success and expansion of microenterprises directly relate to the ability of development banks to achieve their global development mandates. The implementation of microfinance investment aims to enfranchise microentrepreneurs and to positively impact their business and family outcomes. These outcomes then directly impact the likelihood of an individual being able to rise out of extreme poverty, provide food security and educational opportunities to their family, and on an aggregate level allow for the stabilisation and growth of a developing economy. The subsequent alternatives aim to address the potential failures of existing microfinance mechanisms as measured by the following criteria:

1. Impact on Business Outcomes and Cost-Effectiveness
2. Impact on Household Outcomes
3. Expansion of Impact Across a Heterogeneous Borrower Population
4. Financial Viability for MFIs and Development Banks

Impact on Business Outcomes and Cost-Effectiveness: Business outcomes include a variety of factors and can be measured in multiple ways. These include a change in the number of employees employed by a firm before and after the implementation of the intervention, a change in the revenue and operating income of a firm, a change in inventory, payable, & receivable days of the firm's operations (proxies for turnover and efficiency), and a change in the dollar value of accumulated assets and capital held by the firm as well as a range of other factors. These measures convey whether or not the intervention has a positive impact on the firm's growth which in the microfinance space directly indicates a growth in the financial security and capacity of the microentrepreneur that owns the firm. Cost-effectiveness can be measured by normalizing the alternative's impact on the outcome against the amount of capital deployed by development banks and MFIs.

This report considers a matrix of the following quantitative factors: percent change in revenue to the average borrower, percent change in revenue to the experienced borrower, survival of the microenterprise (measured as the percent of firms that

continued to exist after an extended period), and percent change in balance sheet assets. Cost-effectiveness will be measured by analyzing return on investment (ROI). These values will be reported individually and then examined comparatively against the other alternatives by assigning an ordinal rank.

Impact on Household Outcomes: Like business outcomes, household outcomes include several factors and measurements. Example factors include a change in the household's food security level (is there a reduction in levels of food insecurity as a result of the intervention), a change in household capital expenditure on education, and changes in accumulated wealth by the household (measured in households' consumption expenditures). These measures convey whether the intervention or alternative has had a positive impact on a microentrepreneur's household measures of financial security and prosperity. Cost-effectiveness can be measured by normalizing the alternative's impact on the outcome against the amount of capital deployed by development banks and MFIs.

This report considers a matrix of the following factors: the described impact on women's outcomes, the percent change in the amount of capital investment in child education, the percent change in household consumption, and the change in employment status. These values will be reported individually and then examined comparatively against the other alternatives by assigning an ordinal rank.

Expansion of Impact Across a Heterogeneous Borrower Population: This criterion seeks to understand whether an alternative addresses the potential failures of existing microfinance mechanisms in their ability to drive broad transformational change across a subset of borrowers. While existing structures tend to be successful in driving change for a subset of the borrowing population, the average household sees no significant impact on family or household outcomes through access and utilization of microfinance. This criterion can be measured by utilizing quintile analysis to evaluate an alternative's impact across the borrowers. Success for this criteria can be operationally defined as a reduction in the range of impact of an alternative across quintile stratifications.

Within this report, alternatives are evaluated on this criteria by examining quantile analysis conducted in supporting literature to explore whether a mechanism was able to expand the level of impact of capital deployment across a larger subset of borrowers. This analysis is both quantitative and qualitative and will be expressed as low/medium/high.

Financial Viability for MFIs and Development Banks: It is important to account for the range of pressures placed on MFIs and capital lending (government or multilateral) development banks (government or multilateral) to generate a specific level of capital return. The return generated by an alternative can indicate whether the adoption of the alternative is feasible for any, some, or most MFIs. As MFIs range in their mandate from philanthropic to break-even to generating risk-adjusted returns, it is important to understand the investment viability of a mechanism. This criterion can be measured by quantifying the returns to the lending institution through the measurements of Net Present Value (NPV) and Internal Rate of Return (IRR). These measurements analyze the cashflows of MFIs and account for outflows including capital lent and the administrative cost of implementing a mechanism. These outflows are measured against the capital inflows from the payback of principal, revenue generated by interest, and the reduction of inflows relating to the defaulting of a loan. As part of this criterion, I will also discuss whether Development Banks would have to raise additional funds or whether existing levels of development capital are sufficient to implement the alternative.

This report considers a matrix of the following factors: the return on investment to MFIs (as a function of interest rates and repayment schedules), the average default rate of an alternative (indicating capital lost for non-collateralized mechanisms), and a qualitative analysis of the additional administrative requirements to deploy the mechanism when compared to traditional microfinance. These values will be reported individually and then examined comparatively against the other alternatives by assigning an ordinal rank.

Policy Alternatives and Evaluation

The following are the three alternatives I seek to examine as part of this technical report. I will be comparing, 1) Traditional Microfinance and Flexible Repayment Structures, 2) Supply Chain Microfinance, and 3) Asset-Based Microfinance in their ability to address the problem described earlier on the criteria outlined below.

Alternative 1: Traditional Microfinance and Flexible Repayment Structures

Traditional microfinance can be understood as the maintenance of the status quo of existing investment practices by MFIs and Development Banks. Implementation of this alternative would require no change in existing approaches to development finance. Within this alternative, I include the underlying structure of traditional microfinance – lending uncollateralized capital to individual microentrepreneurs with limited checks on capital usage and a fixed repayment schedule – as well as an existing adaptation of traditional microfinance, flexible repayment microfinance. This alternative is intended to be representative of traditional microfinance practices, including those with minor variations to the model. These variations are limited to process changes, not changes in the underlying structure, and include flexible repayment models and sector-accommodating repayment schedules. This alternative does not consider group lending, dynamic incentive lending, or demographic target models which are also existing adaptations of traditional microfinance that are utilized in the space.

Traditional Microfinance is broadly applicable to all individuals who are borrowing capital from MFIs for microenterprise development and growth. This alternative is industry-agnostic and has been deployed in most of the geographies where development capital has been invested. Individuals who borrow capital from MFIs are responsible for paying back both the principal and interest on the loan borrowed. While this capital is often intended for the use of growth, borrowers maintain discretion on the actual capital utilization.

Alternative 2: Supply Chain Microfinance

Supply chain financing has much potential in its application to the microfinance space if used in a payables/receivables purchase-based format. This mechanism would allow MFIs to underwrite a loan that is collateralized by key input materials that the borrower uses in the operations of their business. Supply chain financing has three relevant parties, the MFI, the supplier, and the borrowing microenterprise. A borrower seeking capital to grow and overcome working capital constraints can have their account payables to the supplier be fulfilled by capital borrowed from the MFI and will repay this debt and accrued interest following the creation and sale of their product through the assignment of accounts receivable.

In theory, each of the relevant parties will benefit from the model. MFIs will face lower levels of risk as capital lent is now secured through the collateralization of the input materials sold to the borrower from the supplier. Further, by working with the supplier, the MFI will have access to supplemental data on the borrower's transaction history with the supplier. This data can be leveraged as an instrument for evaluating the borrower's creditworthiness and will reduce information asymmetries that would result in higher levels of risk to the lender. The supplier will benefit by having a larger quantity of inventory sold to the borrower and by the potential increase in the frequency of transactions with the borrower. Further, individual loans are tailored to accommodate a borrower's operational capacity, directly providing a level of flexibility beyond the traditional microfinance model. Finally, the borrower benefits through the overcoming of capital constraints presented by working capital requirements which allows for an increase in overall production, up to existing capacity limitations. The reduction in risk to the lender should result in a reduction of the pricing of the debt instrument and interest pressures placed on the borrower.

Implementing this mechanism would require a fundamental change in the debt products offered by MFIs. MFIs would need to develop the capacity to partner with suppliers and evaluate supplier-borrower transaction history as a proxy for creditworthiness. Further, the MFI would need to have the ability to reclaim the collateral used for securing the

loan in the event of default. Various literature previously discussed suggests that this alternative may be successful in addressing the problems of traditional microfinance structures. Access to additional data would allow the MFI to address the information asymmetry problems related to borrower heterogeneity. Literature also suggests that household and firm outcomes would improve as a result of the limited usage flexibility of borrowed capital, where the microenterprise may only use the capital to purchase the raw material inputs for its operations. Finally, this approach would automatically address the limitation of microinvestment presented by Kaboski, et al (2022) which suggests that such investment is only beneficial when utilized to purchase products with high elasticity of supply – as many raw material inputs would have to be.

Supply chain financing would be able to be used by borrowers across industries that are limited by the cost of raw materials and working capital pressures. Funding this mechanism would not require additional capital to be raised by development banks; instead, development banks could leverage existing capital that has been earmarked for traditional microfinance investment. As the impetus of implementing the mechanism is placed on development banks and MFIs, borrowers would not need to adjust their operations to access this capital. Instead, borrowers would need to understand how this mechanism differs from traditional structures of microinvestment.

Supply Chain Microfinance in Application – An Illustrative Example: To understand what payables/receivables purchase-based formatted supply chain financing looks like, here is a hypothetical example. **Devi's Desks** is a microenterprise that creates school desks for educational institutions in its region. The firm has the human and functional capacity to accept an order as large as 50 desks and fulfill the order within 3 months. Unfortunately, the firm only has the capital capacity to purchase the raw materials for 25 desks. In the supply chain microfinance model, an MFI could partner with the supplier of wood that Devi's Desks purchases wood from. The MFI could leverage the transaction history between the wood supplier and Devi's Desks as an instrument for evaluating creditworthiness. Here, the MFI can provide a loan to Devi's Desk and underwrite the purchase of sufficient raw wood materials for 50 desks. This loan would be

collateralized with the underwritten wood materials. Since the firm would no longer be responsible for the upfront capital requirements of purchasing wood, it can now purchase the necessary remaining raw materials to produce 50 desks. Because of this, the firm accepts an order for 50 desks to be made for its local university. After 3 months, when Devi's Desks creates the 50 desks and receives payment for services complete, it can pay back the MFI for the loan used to purchase the initial order of raw wood materials.

Alternative 3: Asset-Based Microfinance

Understanding the potential of Asset-Based Financing in its application to microfinance has been the focus of much research in the space. As explained in the prior literature review, asset-based microfinance works similarly to our conventional understanding of a home mortgage or car loan. In this model, a microenterprise is seeking capital to purchase a tool, that will support its growth and purchases the tool with capital borrowed from an MFI. This mechanism would allow MFIs to underwrite a loan that is collateralized by the tool that the borrower purchases to expand business operations. Most commonly, the borrower is responsible for an equity down payment of about 10% of the cost of the tool. The borrower can immediately incorporate the tool into its operations which should allow for a significant increase in productivity and cashflows. Through these cashflows, the borrower pays both principal and interest, monthly or weekly, to the MFI to gain full ownership of the tool. Often, the borrower has gained complete ownership of the tool within two years.

Asset-based microfinance targets the consequences associated with poverty traps and a borrower's inability to purchase a tool that is available to the broader market (the tool is not limited in quantity for the market at large and thus is elastic in supply). This tool has the potential to significantly improve the productivity of the microenterprise resulting in improvements of household and firm outcomes. Without the support of microcredit from an MFI, a borrower is unable to purchase the tool and is limited to using available subpar mechanisms to perform its business operations.

The benefits to both the MFI and the borrower are similar to those seen in the supply chain microfinancing structure. Lenders enjoy a reduction in risk due to the collateralization of the loan and by knowing how the capital will be utilized. Borrowers benefit by overcoming capital constraints presented by the lumpy investment requirements of the tool, and can immediately utilize the tool to increase overall production and capacity. The reduction in risk to the lender may result in a reduction of the pricing of the debt instrument and interest pressures placed on the borrower as well as allows for an extended repayment period, beyond the traditional three to six months.

Like in the deployment of SCF, implementing this mechanism would require a fundamental change in the debt products offered by MFIs. MFIs would need to develop the capacity to evaluate the impact of the underwritten tool on the borrower's cashflows and the ability of the borrower to fulfill its debt requirements with the addition of the tool. Further, the MFI would need to have the ability to reclaim the collateral used for securing the loan in the event of default. The various literature previously discussed suggests that this alternative may be successful in addressing the problems of traditional microfinance structures. This model limits the usage of borrowed capital, where the microenterprise may only use the capital to purchase the underwritten tool in question, which may also result in an improvement of outcomes when compared to traditional structures.

Asset-based microfinance would be able to be used by borrowers across industries that are limited by capital constraints and the lumpy investment requirements of purchasing tools needed to expand their operations. Funding this mechanism would not require additional capital to be raised by development banks; instead, development banks could leverage existing capital that has been earmarked for traditional microfinance investment. The impetus for implementing this mechanism would fall on both the lender and borrower. The lender would need to make the fundamental changes outlined above. The borrower would be required to identify a tool that would expand its operations as well as successfully incorporate the tool into its production process to expand cashflows and pay down debt acquired by purchasing the tool.

Asset-Based Microfinance in Application – An Illustrative Example: To understand what asset-based financing looks like, here is a hypothetical example. **Michael's Mechanics** provides automotive and repair support to its local community. The firm is well-regarded but is considered as being inefficient when it comes to project turnaround. If the firm were to purchase the Efficiency Improver X would be able to improve its turnaround times by a factor of two. This would result in a 2 times increase in topline revenue and 2.3 times increase in firm profit. Unfortunately, the Efficiency Improver X

costs $1000, something that Michael's Mechanics can not afford in one lump sum payment. An MFI can underwrite the purchase of the asset with Michael's Mechanics paying $100 in down payment, something the firm can afford. The firm would then pay $50 a month towards the principal and $10 a month as interest for 18 months. At the end of 18 months, the firm will fully own the machine. The firm will be able to pay for the device with its synergistic increase in cashflows from its use – not too dissimilar from the standard theory surrounding leveraged buyouts in the private investment sector. The MFI will be able to use the Efficiency Improver X for collateral of the loan and will make 18% of the cost of the asset purchase in revenue over 18 months. Following the repayment of the loan, Michael's Mechanics will continue to enjoy the benefits of owning the device.

Additional manifestations of asset-based microfinance that can illustrate the diverse application of the mechanism can be seen in the following examples:

1. A delivery driver purchasing a scooter as an upgrade from a bicycle
2. A bakery purchasing a cooling unit to expand its storage capacity
3. A hairstylist purchasing electric shears to improve client capacity

Evaluation of Alternatives on the Criteria

Traditional Microfinance - Rigid Repayment Loans:

Literature has demonstrated a range of outcomes for each of the following factors. This range is outlined below:

Impact on Business Outcomes and Cost-Effectiveness

0% to 8.5% Average Annual Increase in Revenue	***(a)*** reviewed 7 distinct RCTs and found that traditional microcredit models did not result in a high-return investment or lead to transformative results for the average borrower. ***(b)*** found that access to traditional microfinance resulted in an average 7% increase in microenterprise income levels over two years - demonstrating an annual compoundable growth in revenue of 2.65%. ***(c)*** found that for women, access to microloans of ~2,400EGP resulted in a statistically significant increase in revenue of 205EGP one year later or an 8.5% increase in revenue relative to women who did not have access to microloans. The same study found no significant impact on revenue for male borrowers.
12.25% Increase Revenue for Experienced Borrowers p.a.	***(d)*** found that six years after access to microfinance, the revenues of firms managed by gung-ho microentrepreneurs had doubled, suggesting an annual compoundable growth in revenue of 12.25%.
40% to 95% Annual Return on Investment	***(e)*** found that traditional microfinance resulted in a real return on capital of 5.7% per month, suggesting an annualized rate of return of up to 95%. ***(f)*** found, in a study of Mexican microenterprises, a return on investment of 3% to 5% per month or between 40% and 80% annually.
3.8% Increase in the Likelihood of Survival over Six Years	***(d)*** found that households with access to microfinance were 3.8% more likely to continue having a business than households without access to microfinance services, 6 years after the treatment households are given access to microfinance services.
5.8% Annual Increase in Balance Sheet Assets	***(d)*** found that for Gung Ho Borrowers, business assets increased by 40% over six years, suggesting an annual compoundable growth in business assets of 5.8%. ***(c)*** found that for women, access to microfinance resulted in a statistically significant increase in business assets with women in the treatment group increasing business assets by 363EGP more than women in the control group. The percent change in assets is not provided. The same study found no significant impact on business assets for male borrowers at the 95% confidence level.

(a) Breza, E., & Karlan, D. (2023)
(b) Bruhn, M., & Love, I. (2014)
(c) Crépon, B., Komi, M., & Osman, A. (2023)
(d) Banerjee, A., Breza, E., Duflo, E., & Kinnan, C. (2019)
(e) De, S., David, M., & Woodruff, M. (2007)
(f) McKenzie, D., & Woodruff, C. (2006)

Impact on Household Outcomes

14% Increase in the Likelihood That a Woman is Employed but No Change in Women's Empowerment	***(a)*** found that for women, access to microfinance resulted in a statistically significant increase in employment with women in the treatment group 14 percentage points more likely to be employed than women in the control group. The same study found no significant impact on employment for male borrowers at the 95% confidence level. ***(b)*** found that the traditional microcredit model did not lead to an increase in women's empowerment.
No Change in Education Outcomes	***(b)*** found that access to traditional microfinance did not increase investment in children's education.
18.9% Change in Consumption for Experienced Borrowers	***(c)*** found that access to traditional microfinance resulted in an 18.9% increase in consumption for gung-ho households with no change in consumption for non-gung-ho enterprises.
Access to Microfinance Resulted in a 1.4% Reduction in Local Unemployment	***(d)*** found that access to traditional microfinance resulted in a 1.4% reduction in unemployment within a region. ***(c)*** found that access to MFIs resulted in an increase in self-employment hours by almost 20%. Such households were also more likely to have more than one and more than two workers compared to households without access to an MFI.

(a) Crépon, B., Komi, M., & Osman, A. (2023)
(b) Breza, E., & Karlan, D. (2023)
(c) Banerjee, A., Breza, E., Duflo, E., & Kinnan, C. (2019)
(d) Bruhn, M., & Love, I. (2014)

Expansion of Impact Across a Heterogeneous Borrower Population

Quantitative and Quantile Analysis	***(a)*** found that access to traditional microfinance resulted in a 7.6% increase in the proportion of informal businesses with a larger impact for individuals with below-median income levels and for microenterprises that were relatively under-served by the formal banking sector. ***(b)*** found that for microentrepreneurs with 6 or fewer years of schooling, treatment resulted in on average a negative or zero return. For microentrepreneurs with 8 years of schooling, treatment resulted in on average a 2.2% monthly return. For microentrepreneurs with 10 years of schooling, treatment resulted in on average a 5.0% monthly return. For microentrepreneurs with 11 years of schooling, treatment resulted in on average a 6.4% monthly return. ***(c)*** found that traditional microfinance had almost no effect on non-gung-ho enterprises when comparing them to non-gung-ho enterprises outside the treatment group.
Qualitative Commentary	***(d)*** suggests that microloans are more beneficial to borrowers living above the poverty line than to borrowers living below the poverty line. This is because poorer borrowers tend to take conservative loans to protect their own subsistence. These borrowers rarely utilize borrower capital to reinvest in their business. ***(e)*** found that for the poorest borrowers, traditional microcredit could result in adverse outcomes and worsening poverty despite microcredit being successful in reducing poverty in a majority of cases.

(a) Bruhn, M., & Love, I. (2014)

(b) De, S., David, M., & Woodruff, M. (2007)
(c) Banerjee, A., Breza, E., Duflo, E., & Kinnan, C. (2019)
(d) Karnani, A. (2007)
(e) Jahiruddin, A., Short, P., Dressler, W., & Khan, M. A. (2011)

Financial Viability for MFIs and Development Banks

16% to 18% Annual Return on Investment for Non-Defaulted Loans	***(a)*** demonstrate that typical nominal market interest rates for microloans are 16% to 24% p.a. for two-year loans.
Average Default Rates of 10% to 20%	***(b)*** found that the average default rate for microloans ranges from 10% to 20%.

(a) De, S., David, M., & Woodruff, M. (2007)
(b) Kiraka, R. N., Kobia, M., & Katwalo, A. M. (2013)

Traditional Microfinance - Flexible Repayment Loans:

Literature has demonstrated a range of outcomes for each of the following factors. This range is outlined below:

Impact on Business Outcomes and Cost-Effectiveness

16% to 87% Average Increase in Annual Revenue	***(a)*** found that the provision of a two-month grace period allowed borrowers to overcome lumpy capital requirements, resulting in a 41% increase in profits when compared to rigid repayment structures within traditional microfinance. This also resulted in a 20% increase in revenue relative to the rigid repayment group. In another study based in Bangladesh, ***(a)*** found that the option to delay two repayments resulted in a 16% increase in annual revenue. ***(b)*** found that access to flexible repayment structures increased revenue by ~87% and increased profits by ~25%.
Revenue for Experienced Borrowers.	There is limited data that analyzes both flexible repayment structures and the presence of borrower heterogeneity (inexperienced vs experienced borrowers).
Annual Return on Investment	Most studies focus on the relative change in revenue compared to rigid traditional microfinance structures and do not outline the return on investment of a microloan with flexible repayment.
Likelihood of Survival	Data is limited on the impact of traditional microfinance loans with flexible repayment structures on a firm's likelihood of survival.
Balance Sheet Assets	Data is limited on the impact of traditional microfinance loans with flexible repayment structures on a firm's balance sheet.

(a) Breza, E., & Karlan, D. (2023)
(b) Cai, J., Meki, M., & Quinn, S. (2023)

Impact on Household Outcomes

Women's Outcomes	Data is limited on the impact of traditional microfinance loans with flexible repayment structures on women's outcomes.
Education Investment	Data is limited on the impact of traditional microfinance loans with flexible repayment structures on a household's investment in education.
20% Increase in Household Consumption	***(a)*** found that access to flexible repayment structures resulted in a 20% increase in household income and consumption. ***(b)*** found that by providing a temporary moratorium on repayments during the Monga period, household food consumption positively increased.
Employment Status	Data is limited on the impact of traditional microfinance loans with flexible repayment structures on a household's level of employment.

(a) Cai, J., Meki, M., & Quinn, S. (2023)
(b) Shonchoy and Kurosaki (2014)

Expansion of Impact Across a Heterogeneous Borrower Population

Quantitative and Quantile Analysis	***(a)*** found in an 11-year follow-up of their study that illiterate microentrepreneurs increased their income by 27% when compared to their illiterate counterparts who did not receive a traditional microfinance loan with flexible repayment.
Qualitative Commentary	***(b)*** found that the effects of introducing a flexible repayment model were larger for the most risk-averse clients. Borrowers who were less risk-averse experienced minimal impact. ***(c)*** found that the welfare gains to microfinance borrowers due to the introduction of flexible microcredit are significantly higher when compared to the welfare gains of traditional inflexible microfinance.

(a) Breza, E., & Karlan, D. (2023)
(b) Cai, J., Meki, M., & Quinn, S. (2023)
(c) Subir Bairagi, & Wasel Shadat. (2016)

Financial Viability for MFIs and Development Banks

5% to 25% Annual Return on Investment for Non-Defaulted Loans	***(a)*** found that most MFIs have profit margins between 5% and 25%. The researchers also found that previous studies on flexible microfinance convey that while borrowers' surplus may increase, lenders may be worse off. ***(b)*** found that a more flexible repayment schedule can reduce transaction costs to the MFI without increasing a borrower's likelihood of default.
Average Change in Default Rate of -35% to 213% Relative to Traditional Microloans Without Flexibility **It Is Difficult to Evaluate Whether Flexibility Results in a Positive Or Negative Effect… However, a Majority of The Presented Evidence Suggests Some Level of Positive Impact**	***(c)*** found that in an India-based study, borrowers of flexible repayment loans were not more likely to default than borrowers of traditional loans after four months. Alternatively, another study analyzed in this paper found that a two-month grace period increased a borrower's likelihood of defaulting by 213% relative to traditional rigid microfinance. Another study found that an option to defer payments raised the likelihood of repaying the full loan early by 10 percentage points of 33% after 3 years. A study in Bangladesh found that an option to delay up to two repayments resulted in a reduced likelihood of default of 1.7 percentage points of 35% relative to traditional rigid loans. ***(d)*** found a statistically insignificant difference between traditional microloans with and without flexible repayment schedules regarding default rates. ***(e)*** found that offering a flexible repayment option resulted in no difference in the likelihood of late repayment but had a 30%-40% increase in the probability of a borrower repaying a loan early.

(a) Subir Bairagi, & Wasel Shadat (2016)
(c) Field and Pande (2008)
(d) Breza, E., & Karlan, D. (2023)
(e) Shonchoy and Kurosaki (2014)
(f) Barboni, G., & Agarwal, P. (2023)

Supply Chain Microfinance:

Evidence for the success of Supply Chain microfinance is highly limited. Existing evidence is outlined below:

Impact on Business Outcomes and Cost-Effectiveness

Average Annual Change in Revenue	***(a)*** found an average growth in sales of 20%.
Revenue for Experienced Borrowers	There is limited data that analyzes both supply chain microfinance and the presence of borrower heterogeneity (inexperienced vs experienced borrowers).
Annual Return on Investment	Data is limited on the impact of supply chain microfinance on a firm's return on investment
Likelihood of Survival	Data is limited on the impact of supply chain microfinance on a firm's likelihood of survival.
Balance Sheet Assets	Data is limited on the impact of supply chain microfinance on a firm's balance sheet.

(a) Better than Cash Alliance's (2018)

Impact on Household Outcomes

Women's Outcomes	Data is limited on the impact of supply chain microfinance on women's outcomes.
Education Investment	Data is limited on the impact of supply chain microfinance on a household's investment in education.
Household Consumption	Data is limited on the impact of supply chain microfinance on household consumption
Employment Status	Data is limited on the impact of supply chain microfinance on a household's level of employment.

Expansion of Impact Across a Heterogeneous Borrower Population

Quantitative and Quantile Analysis	***(a)*** found that 62% of microenterprises that joined the platform have been able to access formal bank credit lines for the first time.
Qualitative Commentary	***(b)*** found that SCF can be a helpful tool in closing the credit gap of small merchants. It can allow MFIs to reach new or expanded customer segments with low-risk financial services.

(a) Better than Cash Alliance (2018)
(b) Shrivastava, P., Punatar, P., & Stefanski, S. (2019)

Financial Viability for MFIs and Development Banks

Return on Investment for Non-Defaulted Loans	Data is limited on an MFI's return on investment in deploying supply chain microfinance.
Default Risk of Supply Chain Microfinance	While there is minimal data on the direct default risk of supply chain microfinance, there is evidence that suggests that having a proxy for creditworthiness can significantly reduce default risk. ***(a)*** found that access to such data can help lenders predict risk and compare otherwise indistinguishable borrowers. This study found that the top quintile of borrowers measured on risk were 2.8 times more likely to default than those in the lowest quintile.
Administrative Needs	In this model, MFIs would need to be able to partner with suppliers and will need to develop and deploy a methodology that allows the MFI to evaluate creditworthiness by analyzing a borrower's transaction history. The MFI would also need to be able to reclaim collateral in the event of default. Both of these factors result in administrative costs to the MFI but also a significant reduction in the risk of investment.

(a) Björkegren, D., & Grissen, D. (2019)

Asset-Based Microfinance:

Literature has demonstrated a range of outcomes for each of the following factors. This range is outlined below:

Impact on Business Outcomes and Cost-Effectiveness

15% to 67% Average Annual Increase in Revenue	***(a)*** found that in-kind grants (not loans) significantly outperformed both cash grants and microloans in increasing business profits. Average monthly business profits increased by about 225% relative to the control group. Access to in-kind grants of ~2,400EGP resulted in a statistically significant increase in revenue of 491EGP one year later or a 20.5% increase in revenue relative to women who did not have access to microfinance products. The same study found no significant impact on revenue for male borrowers. ***(b)*** found that access to asset-based microfinance resulted in a 15% to 67% increase in sales for borrowers implying an increase in revenue of up to 30% of average monthly household consumption. Such gains are expected to last over the 15-year lifespan of the underwritten asset. ***(c)*** found that two years after borrowers were given access to asset-based microfinance, borrowers had larger businesses (asset-based), improved business management practices (inventory control and purchasing), and greater business performance with an average increase in monthly business profits of 9% relative to the control group that was not given access to asset-based microfinancing.
Revenue for Experienced Borrowers	There is limited data that analyzes both asset-based microfinance and the presence of borrower heterogeneity (inexperienced vs experienced borrowers).
Annual Return on Investment	Data is limited on the impact of asset chain microfinance on a firm's return on investment as most studies focus on the change in business revenues and profits rather than the relative return on investment factoring in the amount of debt assumed.
Significant Increase in the Likelihood of Survival over One Year:	***(a)*** found that 39% of those who received in-kind grants had a business after one year as compared to 15% in the control group.
Relative Increase in Balance Sheet Assets	***(a)*** found that for women, access to microfinance resulted in a statistically significant increase in business assets with women in the treatment group increasing business assets by 515EGP more than women in the control group. The percent change in assets is not provided but this change is much greater than the average increase of 363EGP seen in microcredit. The same study found no significant impact on business assets for male borrowers at the 95% confidence level.

(a) Crépon, B., Komi, M., & Osman, A. (2023)
(b) Jack et al. (2019)
(c) Bari, F., Meki, M., Malik, K. Z., & Quinn, S. (2021)

Impact on Household Outcomes

Significant Impact on Women's Wealth Generation and Employment	***(a)*** found that in-kind (asset-based) grants had a significant impact on women, more than tripling the amount of assets held by these individuals. Further, such grants resulted in a statistically significant increase in employment levels of 21 percentage points for women.
Increased Enrollment of Girls in School and a 26% Average Increase in Education Expenditure	***(b)*** found that access to an asset-collateralized loan appears to solve what is described as "a last-mile problem." The enrollment of girls in school in the treatment group at baseline was already high at the start of treatment and continued to increase to almost 100% by the time the researchers collected impact data. The impact on boys' enrollment in education was insignificant and this demographic appears to have been materially unaffected. ***(c)*** found that relative to the control group, the treatment group had a 26% average increase in educational expenditure which was predominantly driven by an increase in spending on girls' education.
6% Increase in Monthly Household Expenditure	***(c)*** found that the extension of an asset-based microloan resulted in a significant increase in household monthly consumption of about 6%.
Employment Status	***(a)*** found that in-kind (asset-based) grants resulted in a 21 percentage point increase in the likelihood that a woman was employed. The impact on male employment levels was insignificant.

(a) Crépon, B., Komi, M., & Osman, A. (2023)
(b) Jack et al. (2019)
(c) Bari, F., Meki, M., Malik, K. Z., & Quinn, S. (2021)

Expansion of Impact Across a Heterogeneous Borrower Population

Quantitative and Quantile Analysis	***(a)*** found that in-kind grants had no detectable difference across treatment arms (microloans and asset-based grants) at the same quantile. Quantile regression demonstrates that like microloans, the impact on total income from the deployment of in-kind grants is concentrated at the top of the distribution.
Qualitative Commentary	***(b)*** found that access to the asset-based loan increased the rate of asset purchase from about 2% to 40% when compared to the control group. Jack found that almost all borrowers would have been purchasing the asset due to credit constraints. ***(c)*** analyzed the impact of different repayment structures in deploying asset-based microfinance and found that risk-averse borrowers significantly increased take-up of the flexible repayment contract compared to the fixed repayment contract. These borrowers use the flexibility to mitigate against business shocks and benefit from the contact in terms of both business and household outcomes when compared to similarly risk-averse individuals who were only extended a fixed repayment contract. The researchers also found that small lump-sum loans to the borrower will not generate transformational change but that a large transfer of capital (which is possible with collateralized lending) can generate sustained improvements in wealth accumulation and income while also being more financially sustainable to MFIs.

(a) Crépon, B., Komi, M., & Osman, A. (2023)
(b) Jack et al. (2019)
(c) Bari, F., Meki, M., Malik, K. Z., & Quinn, S. (2021)

Financial Viability for MFIs and Development Banks

Positive Annual Return on Investment for Non-Defaulted Loans	***(a)*** found that asset-based microfinance resulted in a small increase in the average late balance relative to traditional microfinance (less than 1% of the loan's total value). The researchers argue that low-deposit collateralized loans are profitable with either a small administrative fee or if assets are priced at retail value. On a loan of ~$300, MFIs were able to realize a profit of about $32 to $37 per loan. ***(b)*** found that the asset-based product demonstrated a high take-up of about 57% and a low rate of default of about 5%.
Mechanisms Convey Very Low Average Default Rates	***(a)*** found that 75% of asset collateralization with individual liability for the balance leads to no repossessions. For loans with 96% asset collateralization (4% down payment requirement), only 1 of 224 loans were defaulted on. In a later replication of the experiment, only 2 of 225 loans were defaulted on, requiring repossession of the collateral. In the study, all the attempted repossessions were successful and the proceeds from repossession were sufficient in covering both the forgone interest and principal.
Administrative Needs	In this model, MFIs would need to be able to develop a methodology that allows the MFI to evaluate the potential benefit of a borrower's requested asset on the borrower's business outcomes. The MFI would also need to be able to reclaim collateral in the event of default. Both of these factors result in administrative costs to the MFI but also a significant reduction in the risk of investment.

(a) Jack et al. (2019)
(b) Bari, F., Meki, M., Malik, K. Z., & Quinn, S. (2021)

Comparative Analysis of the Alternatives

The subsequent section includes an Outcome Matrix that summarizes the findings mentioned above. This matrix is color-coded to demonstrate that the relative best alternative for a given matrix of criteria is represented by the color green. Alternatives that are in the “middle of the pack” are represented by the color orange. Finally, an alternative that is comparatively worse than the other alternatives is represented by the color red. If an alternative has nearly no data for a given category, it is represented by the color grey. For this analysis, I incorporate an inherent value of having data for a given metric. As such, alternatives with strong data on certain dimensions but no data on other relevant dimensions are ranked lower as a result of this lack of data. Resultingly, this analysis is a product of available data and the subsequent recommendation provided should be viewed as preliminary. As outlined further in later sections, it is necessary to conduct a thorough impact analysis to understand how these alternatives truly compare to the outlined dimensions. The categories of the analysis will likely be weighed differently by different parties, development banks may care more about the impact on borrower outcomes whereas MFIs may focus on the viability of scaling a given product. The outcome matrix demonstrates a clear outperformance by asset-based financing against the other alternatives given available data, as such no criteria weighting was considered in this analysis.

In developing a hierarchical rubric for evaluating the studies, I placed significant emphasis on the availability of data. Further, my analysis considers the alternatives when compared to the most conservative and most generous of values of the available data, as well as to the mean values of the available data.

Note to the Reader: It should be noted that for this report I utilize Crépon, B., Komi, M., & Osman, A.’s findings to describe a few of the impacts of asset-based microfinance despite the study providing microloans and in-kind asset-based grants. This is due to the phenomenon described in the study that resulted in the microloans provided having a real interest rate of below zero. As such, it is reasonable to extrapolate certain comparative outcomes when collating traditional and asset-based microfinance.

Outcome Matrix

		Impact on Business Outcomes and Cost-Effectiveness	Impact on Household Outcomes	Expansion of Impact Across a Heterogeneous Borrower Population	Financial Viability for MFIs & Development Banks
Traditional Microfinance	Non Flexible	0% to 8.5% Average Annual Increase in Revenue 12.25% Average Increase in Revenue for Experienced Borrowers p.a. 40% to 95% Annual Return on Investment 3.8% Increase in the Likelihood of Survival Over Six Years 5.8% Annual Increase in Balance Sheet Assets	14% Increase in Women's Employment No Change in Measures of Women's Empowerment Does Not Increase Investment in Children's Education 18.9% Increase in Consumption for Gung-Ho Households No Change in Consumption for Non-Gung-Ho Enterprises. 1.4% Reduction in Unemployment Within the Region	Baseline	16% to 18% Annual Return on Investment for Non-Defaulted Loans Average Default Rates of 10% to 20% depending on an MFI's risk profile
	Flexible	16% to 87% Average Increase in Annual Revenue No Other Data for this Category	20% Increase in Household Income and Consumption Welfare Gains to Borrowers are Significantly Higher When Compared to the Welfare Gains of Traditional Inflexible Microfinance	The effects of Introducing a Flexible Repayment Model Were Larger for the Most Risk-Averse Borrowers Borrowers Who Were Less Risk-Averse Experienced Minimal Impact.	5% to 25% Annual Return on Investment for Non-Defaulted Loans An Average Change in Default Rate of -35% to 213% Relative to Traditional Microloans Without Flexibility
Supply Chain Microfinance		Average Growth in Sales of ~20% for Participating Microentreprenuers	No Data	62% of Borrowers Gained Access to Formal Bank Credit Lines for the First Time. No Other Data for this Category	Limited Data Requires Expansion of MFI's Administrative Capabilities
Asset-Based Microfinance		15% to 67% Average Annual Increase in Revenue 24 Percentage Point Increase in Business Survival Relative to the Control Group 42% Increase in Business Asset Growth Relative to Traditional Microloan Group	21% Increase in Women's Employment Increased Women's Accumulated Assets by up to 3X Increased The Enrollment of Household Girls in School to 100% Did Not Impact the Percentage of Household Boys Enrolled in School 26% Increase in Education Expenditure Relative to the Control Group Increased Household Monthly Consumption by 6%	Insignificant Impact on the Expansion of Impact Relative to Traditional Microfinance Risk-Averse Borrowers Significantly Increased Take-Up of the Flexible Repayment Contract Compared to the Fixed Repayment Contract, Expanding the Base of Borrowers Benefited	10% to 12% Annual Return on Investment for Non-Defaulted Loans Default Rates of 0% to 5% In The Event Of Default, Proceeds From Repossession Were Consistently Able to Cover Both Forgone Principal and Interest Requires Expansion of MFI's Administrative Capabilities

Recommendation

In understanding the takeaways from this report, it is important to consider the limitations of the above analysis. Data on Supply Chain Microfinance is highly limited. As such, the viability of this alternative as the preferred mechanism of capital deployment when compared to the other alternatives cannot be properly evaluated. Further, this report functions as a meta-analysis of data across various reports that may operate under heterogeneous noncomparable conditions. In order to rigorously recommend an optimal alternative for addressing the problems of traditional microfinance structures, an empirically robust study would need to be conducted. Such an RCT would directly compare the impacts of Traditional Microfinance, Flexible Repayment Microfinance, Supply Chain Microfinance, and Asset-Based Microfinance across a homogenous sample population. Factors to consider in developing such a study are outlined in the subsequent section.

Based on the preliminary findings of this report, it is recommended that traditional microfinance structures be progressively replaced with asset-based microfinance structures. This recommendation is based on a matrix analysis that found that in-kind and asset-based investment structures had a stronger positive impact on both business and household outcomes. Further, this alternative appears to be just as if not more financially viable for MFIs and Development Banks to deploy with research indicating high levels of ROI and a significant reduction in the likelihood of default relative to traditional microfinance mechanisms. This financial viability is however limited by the additional administrative capacity that this alternative would require MFIs to develop. MFIs would need to be able to evaluate the impact a requested asset would have on the borrower's business and whether the introduction of the asset would result in financial synergies that would allow the borrower to successfully pay off both the principal and generated interest of the loan. Further, the alternative would require the MFI to have the capability of repossessing an asset in the event of borrower default as well as have the capacity of liquidating the asset to cover the principal-related losses. Current studies suggest that this alternative has no positive change in regards to expanding the impact of the mechanism across a larger portion of the borrowers relative

to traditional microfinance but may be able to benefit from the implementation of flexible repayment models similar to traditional microfinance.

Implementation

Evaluation - Developing a Rigorous Study to Analyze the Alternatives

Moving forward, it would be highly beneficial for players in the space to develop and implement an impact evaluation to better understand how the alternatives compare against a homogeneous sample population. The World Bank Global Solutions Group on Markets and Institutions could play a key role in the deployment of such a study. While the serviceable populations of the various alternatives are highly homogeneous, there are certain industries that each alternative lends itself to. Traditional microfinance has broad applicability across the population of microborrowers whereas supply chain microfinance lends itself to microenterprises that have high levels of inventory turnover and are either a commodity business or a manufacturer with key raw input materials. Asset-based microfinance is traditionally associated with firms with manufacturing capacity, but as seen by Jack et al. (2019) asset-based microfinance can also be utilized to support commodity-based businesses through expansion of operational capacity and efficiency (often in the form of storage and transportation investment).

Asset-based and supply chain microfinance target different components of a borrower's business, which may present a limitation in evaluating the differential impact between the alternatives. Asset-based microfinance aims to grow a firm operational capacity and assumes that a firm would not be limited by working capital limitations when leveraging the new technology. Supply chain microfinance takes a contrasting approach, and instead focuses on the limitations of a borrower's working capital capacity, and assumes that a microenterprise is operating at below operational capacity. This mechanism does not expand the operational capacity of a firm, instead focusing on allowing a microenterprise to increase turnover up to current capacity limitations. As such, a borrower's selection between the two mechanisms may be a function of the borrower's firm characteristics rather than the comparative betterness of one option. This difference may present a barrier to randomized assignment of the alternatives as a borrower may not be interested in pursuing a particular mechanism. For example, if a borrower is seeking capital to expand their capacity (asset-based financing), the borrower may reject the offering of working capital support (supply-chain financing) through

randomized assignment. The same issue may also present in reverse. The selection between these alternatives can be tailored to a given business's circumstances to engineer a more efficient outcome.

To operate such a study, an MFI would also need to have the administrative capacity to undertake all of the functions of the various alternatives. It is recommended to either conduct a large study that includes a borrower population of both commodity-based businesses and manufacturing-based businesses or two smaller studies that target each borrower population individually. The study should consider the comparative nominative value of average asset-based and supply chain loan positions and either aim to make the investment value similar or be able to normalize the investment value to conduct a cost-effectiveness analysis.

Stakeholders - The Role of the World Bank in Leading The Charge

The World Bank Group can leverage its size and connections to drive the shift away from traditional microfinance structures to alternatives such as asset-based lending. The organization can lead the frontier of development finance research to better understand how different mechanisms compare against each other as well as pioneer the deployment of novel implementation mechanisms and practices. In driving such change it remains important to consider the stances of all relevant stakeholders: the bank, its member nations, the MFIs it works with, and the borrowers it seeks to aid. The World Bank Group appears to be in support of exploring alternatives to the traditional microfinance deployment mechanisms and has the capacity and influence to drive forward the change process. Individual MFIs and borrowers are likely agnostic to the idea of shifting away from traditional microfinance as long as a case is made for the alternatives. Such a pitch should incorporate the values held by each stakeholder and weigh such criteria accordingly.

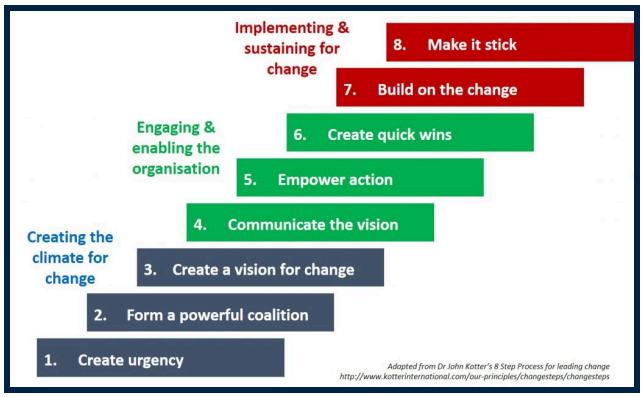

Figure 5: Kotter's 8 Step Process (Every, 2021)

By considering change management and models such as Kotter's 8 Steps for Leading Change (a highly effective framework for creating sustained institutional change), the World Bank can successfully fulfill its mission of ending extreme poverty and boosting prosperity on a livable planet. This report relies on the base merits of creating a stratum of microentrepreneurs compared to other forms of development such as those that focus on building SMEs. Further, it focuses on the selected criteria rather than a host of other reasonable considerations and assumes that investment in growth is preferred to investment in consumption. It is necessary to discuss such assumptions as any change implementation should consider the stakeholders it impacts and the considerations each stakeholder values.

Resources - Developing MFI Capacity to Deploy Asset-Based Lending Capital

How can the deployment of asset-based microfinance as an alternative to traditional microfinance be ensured in its success? It is reasonable to inquire as to whether the mechanism is viable when scaled, whether it is preferred in only certain contexts, and what considerations are necessary to mitigate against the risk of failed deployment. When compared to traditional microfinance, asset-based financing requires an MFI to develop the capacity for additional administrative tasks. For the mechanism to be successful an MFI would likely need to have the capacity to evaluate how a specific asset would impact and grow a given business and its cashflows. The capacity for this evaluation may or may not already be held by an MFI based on how it approaches its traditional microfinance lending process. This process will be easy to develop if an MFI is already evaluating a microentrepreneur's loan proposal from an investment thesis perspective. If an MFI does not have the existing capacity to evaluate a certain asset and its impact on a business, it may be able to gain such capacity through training provided by governments, development agencies, and NGOs.

A second administrative burden (and boon) that asset-based lending provides is found in the collateralization of the loan through the specific asset purchased by the borrower from the raised capital. In the event of default or failed repayment, an MFI would need to be able to repossess a given asset and liquidate the asset to cover lost principal and interest. Further, from an equity perspective, it may also be reasonable to expect an MFI to return the difference in liquidation proceeds and the outstanding balance back to the borrower. Current studies suggest that this administrative requirement is viable for MFIs to develop. In encouraging MFIs to provide asset-based lending, a development bank may consider supporting this administrative task through its resources. Providing the security of collateralization should encourage banks to consider deploying this debt product to their borrowers.

Development banks are important in driving MFIs to move towards the deployment of asset-based lending and can play a catalytic role in providing capital, building capacity, and reducing the risk of product assumption. Banks can provide support on a variety of dimensions including through legal, regulatory, and policy frameworks providing technologies and advisory to MFIs and their borrowers (Chhabra, P., Wilson, J. M., Degenhart, E., Martinez, P., 2021).

Messaging - Educating Borrowers on the Product

There are a number of excellent guidebooks developed by the World Bank Group and the IFC on developing a new debt product. While this section pertains to educating borrowers on asset-based lending, I recommend looking at two guides on the deployment of Supply Chain Microfinance, The IFC's Supply Chain Finance Guidebook (2021) and the IFC's Supply Chain Finance Knowledge Guide (2019). These guides include more broadly applicable recommendations on how to bring the debt product to market and how to educate borrowers on the use of the debt product.

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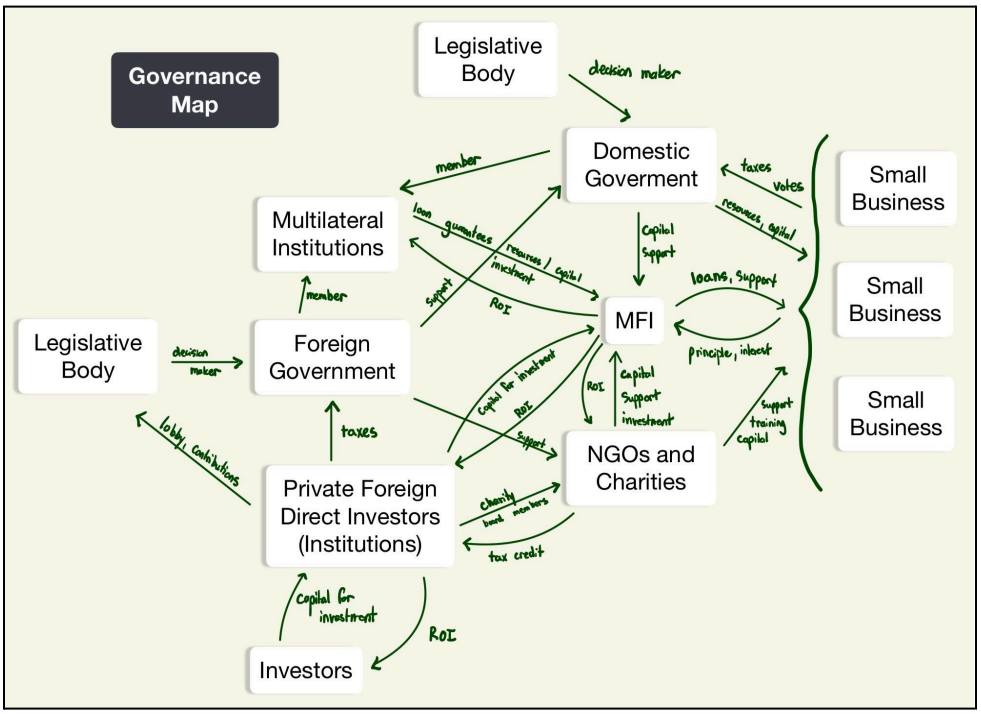
Appendix

Appendix 1: Governance Map



Appendix 2: Root Cause Analysis