

Micro-equity for Microenterprises[#]

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Abstract

Many microenterprises in developing countries have high returns to capital, but also face risky revenue streams. In principle, equity offers several advantages over debt when financing investments of this nature, but the use of equity in practice has been largely limited to investments in much larger firms. We develop a model contract to make self-liquidating, quasi-equity investments in microenterprises. Our contract has three key parameters that can be used to shift risk between the entrepreneur and the investor, resulting in a continuum of contracts ranging from a debt-like contract that shifts little risk from the entrepreneur to a pure revenue-sharing contract in which the investor absorbs much more of the risk. We discuss implementation choices, and then provide lessons from a proof-of-concept pilot carried out by an investment partner, KCG Equity, which made nine investments averaging \$3,800 in Sri Lankan microenterprises. This pilot demonstrates that our contract structure can work in practice, but also highlights the difficulties of micro-equity investments in an environment with weak contract enforcement.

Keywords: micro-equity; microenterprises; microfinance; alternative financing, contract enforcement.

JEL Classification codes: O12, O16, G21.

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1. Introduction

Recent experiments providing grants to microenterprises have found high returns to capital for the average firm (de Mel et al, 2008; McKenzie and Woodruff, 2008; Fafchamps et al., 2014; Hussam et al., 2017). However, these high returns also reflect high risk (Samphantharak and Townsend, 2018). Returns vary substantially across firms (de Mel et al., 2008; Hussam et al., 2017) and over time (Rosenzweig and Udry, 2019), with firm revenues fluctuating by large amounts from one month to the next (Fafchamps et al., 2014), and half of all firms likely to die within six years (McKenzie and Paffhausen, 2019). The most common source of external finance for microenterprises is a loan from a microfinance institution. However, loans have had limited impacts on the profitability and growth of enterprises (Banerjee et al., 2015). One reason is that microfinance contracts structured to minimize default risk may discourage investment in risky projects with high expected returns (Fischer, 2013; Field et al., 2013; Battaglia et al., 2019). Field et al. (2013) experiment with a loan contract providing borrowers with an initial two-month grace period. They find that borrowers with the more flexible contract make riskier, higher-return investments. While the returns are high enough to offset the risk for the firm, the contracts are not profitable to lenders, who suffer the downside of the increased risk without benefiting from the upside of the increased return.

Equity investment offers a potential solution to this situation, with the investor sharing both the risk and reward of the investment. Contracts in which payments to the investor are tied to firm performance increase the willingness of both investors and firms to take on riskier and more uncertain projects (Kerr and Nanda, 2011). However, equity contracts have payoffs that are state-contingent; the amount to be paid depends on the profit or some other outcome that may be observable to the investor only after payment of monitoring costs (Townsend 1979). As a result, equity investments have traditionally been limited to investments large enough to justify paying these monitoring costs, typically restricted to large companies with audited accounts. In this paper, we ask whether equity investments might be extended to microenterprises, for whom accounts are usually informal, and exit through sale of the enterprise is not feasible. We discuss contracts that reduce both the cost of monitoring, for example, by using royalties rather than

profit-sharing, and the need for monitoring, by leveraging repeated interactions and social capital (Banerjee et al. 1994; Ghatak and Guinnane, 1999). We then describe the results of a small-scale micro-equity experiment carried out in conjunction with a chamber of commerce in Hambantota, Sri Lanka.

Micro-equity is a well-established concept, but implementation remains rare (Pretes 2002).¹ One example of this is the Islamic financing *musharaka* contracts, in which the lender's return comes as profit sharing, rather than fixed interest. In practice, such contracts appear to be rarely used with microenterprises. The *murabahah* contract, in which the lender purchases an asset that the microenterprise then buys back in installments at a cost plus mark-up is the much more common financing form (Rahim, 2010).² Micro-equity has also been discussed in the social-investing space as either an alternative or complement to microfinance (e.g. Chowdhry, 2010; Ayayi, 2012). However, in practice there are few concrete examples that show how such contracts could be structured, or demonstrations of how they would work in practice with microenterprises in developing-country settings.³

We design a model contract for making micro-equity investments in existing microenterprises. We face several difficulties in mapping typical angel finance / venture capital funding models to the microenterprise context. First, the target enterprises are at least partially informal. They rarely use external accountants, and may not keep formal records. Most of their business transactions are in cash. Second, the target businesses are owner managed. There is no market for the sale of the business, either through an initial public offering (IPO) or through a sale to a larger business. That presents a serious constraint on investor exit options. We address these issues by basing contract payments on revenues, which investors find somewhat easier than

¹ Pretes (2002) discusses the need for inclusion of micro-equity in the financial toolkit for microenterprises, but proposes using grants rather than investments to serve the purpose.

² Chong and Liu (2013) report that only 1 percent of investments by Islamic banks in Indonesia involve profit-sharing, and Azmat et al (2016) discuss “replica” contracts that mimic standard loans rather than fully sharing risk. Islam and Ahmad (2019) discuss reasons why the profit-sharing form of financing has not been undertaken with poor entrepreneurs, including asymmetric information, adverse selection, and moral hazard concerns.

³ One organization that conducted early pilots in this space was inVenture. However, Singh and Ingawale (2014) describe how the organization quickly pivoted from trying to provide equity funding to small firms to providing a text-based daily record-keeping system that could be used to help record transactions in firms, with the idea that this might be used by others interested in making such investments.

profits to monitor, and by having the firm buy back the equity investment through additional revenue-based payments or through fixed monthly payments.⁴

The contract calls for monthly payments comprised of two components: a fixed amount that at least partially repurchases the equity investment, and a specified percentage of relevant monthly revenues that provides the investor's return and any part of the initial investment not returned in the fixed payments. The percentage of revenues to be paid by the firm is calculated from four key parameters: 1) the projected post-investment revenues of the firm during the investment period (36 months in our case); 2) the expected rate of return on investment for the equity investor; 3) the share of the capital (equity) investment bought back through the revenue-sharing mechanism; and 4) the proportion of base-year, pre-investment revenues that are excluded from the calculation. The contract allows the parties to flexibly shift risk from the entrepreneur to the investor by varying the contract parameters. In particular, increasing either of the last two parameters increases the share of the risk borne by the investor, and decreases the share borne by the entrepreneur.

We discuss the challenges of these contract design features in much more detail below. KCG Equity, our investment partner, faced challenges both in fixing the contract parameters, and in collecting and enforcing the return on the investment. Entrepreneurs may have an incentive to underreport revenues, for example, especially given the cash-based nature of the businesses. Moreover, the lack of an exit strategy significantly alters the incentives of the entrepreneur receiving the investment. Our design leveraged the social capital of the local chamber of commerce to decrease malfeasance, and KCG Equity signaled to all parties a willingness to expand the investment program if it proved successful at the pilot stage.

After describing the contract, we present results from a proof-of-concept pilot of the contract with nine investments made in Sri Lankan microenterprises in 2013. KCG Equity, a private entity established to test the contract, invested between LKR250,000 and LKR700,000 (\$1,984

⁴ Several investment organizations operating in Africa make limited use of royalty-based quasi-equity contracts similar to the one we implement in Sri Lanka. See annual reports of Business Partners Limited (www.businesspartners.co.za/en-za), GoFin (www.grofin.com/), and SEAF (seaf.com), and the discussion of these in Kulasinghe et al. (2018). The minimum investments by these entities is typically many times larger than the investments made by KCG Equity in our study.

to \$5,556)⁵ in the enterprises. These case studies illustrate how such contracts can be implemented in practice, and also highlight some of the challenges of making these investments in an environment in which firms do not have externally verifiable accounts, and in which enforcement of contracts is difficult. Even with the chamber as a partner, the overall portfolio made a loss: While several of the investments worked as designed, some entrepreneurs failed even to make the fixed payments related to the return of capital called for in the contract. At least in this instance, either the chamber's social capital, the investor's signals of scaling up, or both, were not sufficient disciplining devices. We draw lessons from this experience for future efforts.

2. Making Micro-Equity Investments in Microenterprises

The classic theory of investment of Modigliani and Miller (1958) shows that the value of a firm is independent of how it finances itself. In this world, micro-equity should provide exactly the same benefits to a firm that they can attain through using debt financing. However, among the assumptions required for this to hold are the absence of asymmetric information and moral hazard, and either risk-neutral or the ability to fully diversify risk. When these assumptions are not met, the choice of debt and equity contracts will affect the investments and growth of firms.

Both debt and equity contracts require that the investor or lender is able to collect and enforce the return on investment. However, while a standard debt contract calls for the borrower to pay a fixed amount regardless of circumstances, any equity contract will call for state-contingent payments. If the relevant state is observable to the recipient of the investment, but observable to the investor only after payment of some monitoring cost, then recipients may have an incentive to misreport. Indeed, this costly state verification (Townsend 1979) provides a motivation for fixed-payment debt contracts that provide no element of insurance to the (possibly risk-averse) borrower. While Townsend models the relationship between borrower and lender in a single-period model, Webb (1992) shows that state-contingent payments may be efficient in the first period of a two-period model. Webb's insight is that the prospect of the second period contract provides some incentive for investees to report honestly about first-period outcomes.

Costly state verification represents a challenge to the idea of providing even fixed-payment debt financing to very small borrowers, as the cost of auditing when borrowers report their income

⁵ We use an exchange rate of \$1 to Rs. 126 prevailing in February 2013, at the time of our first investment, and use Rs. to denote Sri Lankan rupees and \$ to denote US dollars throughout.

being too low to be able to repay the loan will overwhelm margins on repaid loans. Microfinance based on group lending is a potential solution to this, and a series of papers shows that both group lending and repeated interactions provide at least a partial incentive for the problems of costly state verification. For example, Banerjee et al. (1994) and Ghatak and Guinnane (1999) show that both dynamic incentives from repeated interactions and community monitoring lower the costs of state verification in micro finance contracts. The dynamic incentives come from the prospects of future interactions between borrower and lender. The community monitoring works both *ex ante*, as low-risk borrowers have incentives to use their local knowledge of fellow borrowers to sort into groups with other low-risk borrowers, and also *ex post*, as group members can both monitor at lower cost and sanction using social capital. We discuss later how we incorporate the lessons from the microfinance contracts in the design of our contract.

The standard debt contract, with the same repayment regardless of circumstances, provides no insurance to borrowers. If investments are risky and returns uncertain, liquidity-constrained firm owners may have difficulty making repayments in periods where returns are low (Field et al, 2013; Battaglia et al, 2019). This can lead risk-averse firm owners to choose safer, lower return, investments over high return opportunities that come with some risk (Fischer, 2013).

The result is that debt is likely to be the optimal financing instrument for many mature firms that are financing working capital needs and making relatively standard types of equipment investments, whereas equity may be more suitable for young and growing firms making less certain investments. The key questions for an investor are then how to design a viable equity contract for such firms, how to select these growth-oriented firms, and how to mitigate the enforcement problems and collect on this investment. We discuss each in turn.

2.1 A micro-equity contract: conceptual issues

There is little experience with micro-equity contracts (ME), and, so far as we are aware, no theory specific to micro-equity that addresses how the contracts affect incentives of entrepreneurs and investors. We discuss those issues here, taking the standard venture capital contract (VC) used to make equity investments in larger firms as a benchmark. The context in which VC operates and the context in which micro-equity operates are likely to differ in several respects. We focus on three key differences that stem from the fact that the businesses in which ME invests: 1) cannot be easily valued, either at the point the investment is made, or at any point

thereafter; 2) typically have semi-formal accounting systems, and operate largely with cash transactions, making moral hazard issues more extreme; and 3) are ongoing businesses that are likely to show a substantial but not explosive rate of growth following the investment. The enterprises which ME is likely to target are almost exclusively owner-managed. Sales of businesses of this size are very rare, and arms-length sales are even rarer, at least in these settings.⁶ Thus, the standard VC exit option of sale through IPO, merger, or acquisition, is not available. The market for the sale of the business in the VC model provides a valuation of the business at the point of exit. This is key because the ability to place a market value on the firm, even in the absence of a sale, allows contracting over the market value at some future point in time. The ability to value the business now and in the future is the feature that, as Gompers (1995, P. 1467) puts it, “allows an ex post settling up...” of the investment.

We begin with a comparison of stylistic VC and ME models of investment. We model the ME contract as a self-liquidating, revenue-based, royalty contract. We focus first on the assumption that the VC model allows the business to be fairly valued by markets, while the ME model assumes that market valuation of the business is not feasible. The ability to value the business has two beneficial effects. First, it allows the VC investor to capture a share of the discounted profit stream in perpetuity, whereas the ME investor captures a share of the profits only over the shorter period prior to exiting the investment. This allows the VC investor to realize the same return with a lower share of profits, since her share is effectively captured over the life of the business. Second, the ME contract incentivizes a shift profits into the future, to periods in which the profits accrue entirely to the entrepreneur, while VC model effectively taxes the entrepreneur’s effort equally in every period.⁷

The entrepreneur’s share of the profit stream in the VC model can be expressed as:

$$\pi_{VC}^E = \sum_{t=1}^{\infty} (1 - v)(R_0 - C_0)(1 + g(e_t))^t \quad (1)$$

⁶ McKenzie and Paffhausen (2017) note that no business in a sample of microenterprise in Ghana was sold within a year of the first survey, while in a survey of Sri Lankan microenterprises, only 1.5 percent of the businesses that the original owner was no longer operating had been sold.

⁷ In a model with fixed, per-period, costs of readying the business for sale, the entrepreneur will have incentives to front-load effort in order to retain a larger share of the business at the time of the sale.

Where v is the share of the firm's profit allocated to the investor, R_0 and C_0 are revenues and costs in the base period and g is the rate of profit growth, incorporating time discounting. Profit growth is a function of e_t , the effort exerted by the entrepreneur to increase profits in each period.

In the absence of a sale-based exit option, we assume the contract is self-liquidating. The investor exits through repurchase of the investment. This repurchase can take one of two forms: transfer of a share of sales to the investor sufficient to repay (in expectation) the capital investment and the return, or repayment of the capital investment on a fixed schedule, with the return on investment coming as a share of sales. Thus, there is some point at which the entrepreneur has bought the investor out of the business, after which the entrepreneur retains the full profit stream. We therefore write the entrepreneur's share of the profit stream under the ME contract to reflect two distinct periods:

$$\pi_{ME}^E = \sum_{t=1}^y \{[(1-m)R_0 - C_0](1 + g(e_t))^t - k_t\} + \sum_{t=(y+1)}^{\infty} (R_y - C_y)(1 + g(e_t))^{(t-y)} \quad (2)$$

where m is the share of revenues allocated to the investor, k (possibly equal to zero) is the fixed payment associated with repayment of the investment, and y is the period over which the investor retains a share of the profits. To reflect the contract we implemented, and for the sake of simplicity, the share m remains fixed over the term of the investment, rather than declining as the investment is reduced. In general, m could be time varying.

The entrepreneur will choose effort to equate the marginal cost and marginal value of his effort. Both the VC and ME contract lead to distortions in the effort choice with respect to the first best. Relative to the equity (VC) contract, the royalty (ME) contract intensifies the distortions for three reasons. First, the return on the investment is captured in y periods in the ME contract and over the life of the firm in the VC contract, since future profits are capitalized into the price at which the business is sold on exit. This implies that $m > v$, so with convex effort costs, the entrepreneur will exert lower effort with the ME contract. Second, as noted by Jensen and Thursby (2001), royalty contracts distort the firm's production function by, for example, incentivizing sale of higher-margin products. Third, given the self-liquidating nature of the contracts used in the ME context, a further inter-temporal distortion occurs. Since the ME contract discretely increases the share of profits the entrepreneur retains after repurchase, she has

an incentive to shift profits from the present to the future. Neither of the latter two distortions is present with the VC contract; all three distortions affect the entrepreneur's effort function $g(e)$. Finally, in a context in which measurement of sales is difficult, the ME contract also gives the entrepreneur an incentive to hide sales. Misreporting by the entrepreneur may also be a concern in the VC contract. But where the share of investment is based on the valuation of the business, at the time of investment, it is less clear the entrepreneur will have the incentive to underreport revenues or profits (see, for example, Webb 1992).

The fact that the VC contract allows the investor to capture a share of profits in perpetuity through the sale of the business gives the VC contract an advantage over the self-liquidating ME contract. But do royalty-based contracts have advantages? Savva and Teneri (2015) note that universities often privatize their research through contracts that involve both an equity stake and a royalty share. The prevalence of the royalty share suggests that, in spite of the disadvantage highlighted above, the contract may have offsetting advantages. Savva and Teneri focus on the difficulty a university's Technology Transfer Office (TTO) has in valuing the commercial potential of the invention at the time the contract is signed. In particular, they note that university's TTO is at a significant informational disadvantage relative to the inventors. In the face of this informational disadvantage, Savva and Teneri show that by offering the investor a choice of multiple contracts with varying equity and royalty shares, the TTO can induce the investor to reveal information about his expectations for the market demand for the invention.

This informational disadvantage will also generally be a characteristic of ME investors, because the small scale of the investment will not support a large fixed investment in gaining expertise in a specific sector.⁸ We show in Section 2.3 that varying the share of the investment that is repaid as a fixed payment rather than through an increase in the royalty rate also induces the entrepreneur to reveal information about her prospects for growth.

2.2 A micro-equity contract in practice

The conceptual discussion suggests the inability to value the business leads to inherent disadvantages of micro-equity relative to standard venture capital contracts. The contract we

⁸ We explored the possibility of working in the tourism sector, but for logistical reasons, that was not possible. Micro-equity funds that could focus on a single sector might gain expertise that would overcome this problem, or at least make the informational disadvantage comparable to that faced in more typical VC contexts.

designed mitigates these disadvantages at the cost of shifting risk away from the investor and toward the entrepreneur. In practice, we face a trade-off between purer equity contracts with greater moral hazard concerns and more debt-like contracts that shift less of the risk and reward to the investor. We discuss two parameters that determine where on the equity-hybrid debt spectrum the particular investment lies.

The basic contract calls for the investor to make an investment of amount I (e.g. Rs. 500,000) in the microenterprise. This investment is made as a silent partner, so that the investor does not have control over the day-to-day operations of the business, but also is not responsible for any debts or liabilities incurred by the microenterprise. In exchange for this investment, the investor and microenterprise sign a contract forming a partnership for a fixed period T months (e.g. 36 months). During the partnership period, the entrepreneur makes monthly payments which provide (in expectation) the return of, and a return on, the invested capital. The monthly payment has two components: a fixed, predetermined, amount to repay a share (ranging from zero to 100 percent) of the capital investment, and a share of the applicable revenues of the business that covers the remaining capital investment and the return on the investment. Varying the share of the capital returned as a fixed payment and the share returned as revenue sharing is one parameter that affects the risk-sharing-moral hazard trade-off.

The contract uses revenue sharing rather than profit sharing for several reasons. The first is that revenue is more easily monitored and verified than profits. Second, using revenues reduces the incentive for the microenterprise owner to front-load costs that might have payoffs only after the end of the micro-equity contract. For example, owners could take on additional debt to buy capital, expense the interest, and reduce profits today, but then have the asset once the investor has exited. A downside of revenue sharing is that it offers less insurance to the entrepreneur than profit sharing, since it does not insure the owner against, for example, increases in costs that cannot be passed on to customers.

KCG Equity invested in ongoing businesses. In some cases, the businesses were large relative to the incremental investment supported by KCG Equity. The question arises whether the investor's return should be based on the total revenues of the business or the incremental revenues resulting from the new investment. Because the incremental revenue generated from the new investment is much less predictable than the total revenue from the business, basing the investor's share on the

full business revenues implies shifting less risk to the investor. Thus, a contract calling for royalties based on incremental, rather than total, revenues, has an equity-like feature of shifting more of the risk to the investor. In practice, KCG Equity usually found it impossible to fully separate the revenues of the existing business on the one hand and the incremental investment on the other. Instead, KCG allowed entrepreneurs to exclude a percentage of base-year revenues from the revenue-sharing calculation. Because the revenue-sharing rate is calculated to produce an expected return on the investment amount, the revenue exclusion does not affect the investor's expected return. However, excluding a larger share of the base-year revenue implies that a larger share m of the revenue not excluded is transferred to the investor. In a context in which underreporting of revenues is a concern, this implies a trade-off between risk-sharing and moral hazard.

The contracted payments for an investment of amount I were then determined as the sum of two components:

- a) Fixed payments: the microenterprise pays a share δ of the capital investment as fixed payments. The amount of the investment returned as fixed payments can vary from zero (in which case, all capital is returned through a share of revenues) to 100 percent. In our contracts, we allowed a three-month grace period on fixed capital repayments at the start of the contract, implying the enterprises made fixed payments of $\delta I / (T - 3)$ each month after the third month.
- b) Revenue sharing: the microenterprise pays a share m of relevant revenues each month. This provides the return to the investor as well as the share $(1-\delta)$ of the invested capital not repaid through fixed payments. We denote the share of base-year revenues excluded from the calculation as B , with enterprises paying an amount $\max[m(R_t - B\bar{R}), 0]$ where R_t is revenue for the month, \bar{R} is monthly revenue for that month in the year before the contract was signed, and $0 \leq B \leq 1$ is the share of prior revenue shielded from revenue sharing.

The proportion of revenues shared, m , varies with the choice of δ and B . The share increases as more of the capital is repaid through revenue sharing (that is, as δ becomes smaller), and as the share of excluded base-year revenues increases (that is, as B increases). As a result, contracts that provide to the entrepreneur the most insurance against downside risk (when $\delta = 0$ and $B=1$) will

also require them to share more of their upside gains with the investor. These more equity-like contracts may increase concerns with moral hazard.

Once δ and B are fixed, the investor and entrepreneur must agree on a value for the share of revenue to be received by the investor. This will be a function of the size of the investment, the expected revenue (including revenue growth) subject to the royalty rate, and the targeted return on the investment. The entrepreneur will have an incentive to overestimate future revenue growth, since a higher projected revenue implies a lower m for any given investment and expected return. There are several approaches that can be used to determine m . In practice, we used a spreadsheet that allowed us to consider payment scenarios for varying δ and B , expected revenue growth rates and investor returns, showing each scenario to the entrepreneur.

The revenue share m paid to the investor is a function of seven parameters: I , T , δ , B , \bar{R} , g , and the targeted return on the investment (r). We based the targeted return on a loan-equivalent return, in the aim of both simplicity and transparency with the entrepreneur. That is, we started by determining the monthly payment for a loan amount I over a term T (in months) and an (annual) interest rate r .⁹ We summed this monthly payment over the term of the investment T to determine total (nominal) loan payments. From this, we subtracted the amount of the equity investment to be returned as fixed payments, δI . The result is the total (nominal) amount we aimed to collect through revenue sharing, which is: $\sum_{t=1}^T PMT\left(\left[\frac{r}{12}\right], T, I\right) - \delta I$. We divided this by the revenues subject to the royalty over the investment period, which is $\sum_{t=1}^T \max(\hat{R}_t - B\bar{R}, 0)$. The royalty rate is then

$$m = \frac{\sum_{t=1}^T PMT\left(\left[\frac{r}{12}\right], T, I\right) - \delta I}{\sum_{t=1}^T \max(\hat{R}_t - B\bar{R}, 0)}$$

Note that because the loan payments are assumed to be fixed in each month starting at month one, while the revenue sharing is back-loaded because of expected growth in revenue, the real return to the investor will be lower than the targeted loan-equivalent rate. In our case, the expected return was typically about 2 percentage points less than the targeted loan-equivalent return, or for example, 16 percent rather than 18 percent. Because the subtlety arising from the

⁹ We use T in months and r in years, and hence use the Excel command $PMT([r/12], T, I)$.

difference in discounting is difficult to explain to entrepreneurs, the fact that it goes against the investor is unfortunate from a bargaining perspective, because the actual returns to the investor are generally somewhat lower than the entrepreneur believes them to be.

2.3. Adverse selection and contract choice

Entrepreneurs have an informational advantage in projecting the returns to the investment funded by the equity contract. As in the case of university TTOs discussed by Savva and Teneri (2015), this raises the possibility that offering multiple contracts might induce the entrepreneur to reveal information through the choice of contract. With the micro-equity contract described here, we might vary both the expected return to be realized by the investor and the share of the capital to be paid through fixed payment rather than royalty.

Suppose the ME investor's expectation for growth is g^* and that the entrepreneur's expected growth is drawn uniformly from $[g_L, g_H]$. Assume that investor is correct on average, so that g^* is the midpoint of the range. As in Savva and Teneri (2015), we can show that there is a set of contracts that can be offered to the entrepreneur that will induce her to reveal whether her expected growth is higher or lower than g^* , and that will leave the investor better off than a contract based on g^* .

Suppose the ME investor offers two contracts $\{\Delta, m\}$ or $\{\delta, M\}$, where $\delta < \Delta$ are the shares of capital returned with fixed payment and $m < M$ are the royalty rates including any royalty to pay back the capital. Where the contract parameters are calibrated so that the return to the investor is equalized for each contract at a growth rate g^* , the entrepreneur expecting higher growth ($g > g^*$) will choose the contract with the lower royalty rate, $\{\Delta, m\}$ and the entrepreneur expecting $g < g^*$ will choose $\{\delta, M\}$. Relative to the parameters chosen to equalize returns at growth g^* , this suggests that raising m in the $\{\Delta, m\}$ offer will still induce sorting of high-and low-growth entrepreneurs while increasing the return to the investor.¹⁰

In practice, we allowed the entrepreneurs to choose the share of the investment capital to be paid through fixed capital payments, and, hence, we offered a range of contract choices. But we did not vary the expected return condition on growth across these contracts because we felt this

¹⁰ This discussion ignores variance in risk aversion across entrepreneurs. The $\{\Delta, s\}$ contract allocates more of the risk to the entrepreneur, and hence even for some growth rates $g > g^*$, the entrepreneur may choose $\{\delta, S\}$. This might be compensated by varying B , the share of base-year revenues excluded from the agreement.

would complicate the description of what was a very different type of investment contract from those available to our target firms.

2.4 Selecting which enterprises in which to invest

Microenterprises are abundant in developing countries, but the modal firm is a self-employed owner without any employees, and very few of these firms ever grow beyond micro-size. Moreover, while VC's face a highly skewed distribution of returns (e.g. Hall and Woodward, 2010) in which a small upper tail provides almost all the returns, micro-equity investment will not be able to rely on a few successful "exits" to provide returns. The goal is therefore less about identifying superstar firms, and more about identifying a subset of firms that have high marginal returns to capital, even if most experience only modest growth with the investment.

Several approaches now seem to offer potential for identifying firms with high marginal returns. A first approach is for microfinance lenders to start with debt financing, and to track borrowers through several cycles to learn about their ability and willingness to repay, and, potentially, about the firm's cash flows. This has the advantage of selecting on repayment ability, but because debt financing might exclude high-risk, high-expected-return firms in the first place, this approach may exclude firms whose return on equity financing might be the greatest. A second approach is to work with an institution such as a chamber of commerce, NGO, or training organization that has pre-existing relationships with firms, and has thus observed firm performance over time, and developed a sense of which entrepreneurs are more likely to succeed. Information on entrepreneurs with potential for growth might also be solicited among neighbors (Hussam et al., 2017), an approach that has the advantage of using local knowledge, but which will be dependent on how useful the local knowledge is. An additional advantage of micro-lenders, chambers of commerce, and similar organizations is that they may have social capital with local firms. The investor may benefit, in terms of better reporting and repayment, if firms find value in maintaining relationships and reputations with these local organizations.

A third approach is to have firms apply for funding through a business plan competition or similar competitive mechanism. McKenzie (2017) shows that the firms that apply for such programs tend to be positively selected, and that winners grow rapidly after receiving capital. An alternative approach is to rely on large amounts of data and prediction models to predict which firms will be good investments. McKenzie and Sansone (2019) find machine-learning methods

have very little power in distinguishing growth paths among semi-finalists in a business plan competition. But such models may be better at distinguishing between subsistence and growth-oriented firms among microenterprises. For example, Hussam et al. (2017) find machine learning helps predict which Indian firms have higher returns; Arráiz et al. (2017) find that the algorithm used by the Entrepreneurial Finance Lab is able to use psychometrics to identify borrowers without credit histories who borrow more when given the chance, and who repay at similar rates to other borrowers; and Björkegren and Grissen (2018) find mobile call record data helps predict which borrowers will have better repayment trajectories.

The choice between these methods will depend on who the investor is, and on scale. These methods will differ in terms of their feasibility and cost-effectiveness, and a micro-equity investor may be able to fine-tune this selection process over time through experimentation and the collection of return data.

2.5 Additional contractual options

The contract outlined in the previous section is relatively straightforward, which is important when explaining a new financial product to microenterprise owners. Several additional options might be added to improve the contract, at the cost of additional complexity.

The first is the option of a mid-loan grace period.¹¹ To build further insurance into the equity agreement, the contract might allow the owner to choose one month to defer a payment, to be made up either over later months or by extending the contract one month. This helps if the household or business experiences a shock in a particular month. A second option is for the investor to bundle additional services with the finance. Venture capitalists and angel investors typically provide strategic advice and networking contacts, in addition to financing. They have an incentive to increase the value of the firm, since their returns directly depend on the exit value of the firm. This incentive is much weaker for traditional lenders, who do not directly capture the upside of more rapid firm growth. The incentives for ME investors will lie somewhere between those of the VC and those of traditional lenders. Relative to the VC investor, the incentive is diminished because the ME investor only benefits from advice to the extent it increases short-run revenues rather than the long-term value of the firm. Moreover, coupled with the fact that the

¹¹ See Battaglia et al. (2019) and Barboni and Agarwal (2018) for experiments showing that allowing flexibility of payment timing in standard microfinance contracts leads to enterprises making higher-return investments.

investment amounts are small, any such additional services need to be provided at very low cost to make them profitable to the investor. One example comes from inVenture, which built a tool called inSight that uses mobile technology to allow enterprise owners to text their revenues and expenses daily, and to receive, in return, accounts information, and a credit score that was provided to lenders (Singh and Ingawale, 2014). Other possible ways of investors adding value to small-scale firms are through offering online advice at scale to a portfolio of firms, or through working with a micro-franchising model, whereby the investor provides industry-specific advice along with capital and marketing materials.

2.6 Collecting and enforcing payment

The final step involves the investor verifying the revenue of the microenterprise, calculating the amount owed, and receiving payment. The venture capital literature notes that VCs are most active where information asymmetries are highest (e.g., Gompers 1995). In the context of large firms in high-income countries, this translates to industries with high levels of intangible capital. We are interested in a model that allows investment in firms with almost exclusively tangible assets, but where nevertheless there is a high level of information asymmetry. In our context, this asymmetry comes from the difficulty in valuing assets and recording revenues. Given the high level of cash transactions in our target firms, the entrepreneurs will often have information about performance that will be only coarsely observed by the investors.¹²

Verification of revenue depends on the type of business in which the investment is made. In the best case, revenues of the enterprise may be verifiable from a third party or objective source. This may be the case if the microenterprise sells all of its output to a single buyer (as in some agricultural businesses, or businesses working in a supply chain), through an online platform (such as Aliexpress or Ebay), or when physical measures of output can be readily tracked (as with odometers or GPS tracking of transport providers).¹³ A second case comes from businesses with very simple production functions. For example, an Islamic lender in Egypt described to us making a *musharaka* contract with an egg producer, calculating payments on the basis of the

¹² A similar issue can take place *within* firms, where firm owners have difficulty observing the sales made by workers. See Kelley et al. (2018), who show that introducing technology to reduce this friction can help improve firm growth.

¹³ Chowdhry (2010) gives another example, in which the investor (*Confianza-USA*) takes a share of credit card receipts, in the case of small U.S. enterprises for which such sales are an important share of revenue.

number of chickens the producer had, along with an estimate of eggs produced per chicken on average, and prevailing egg prices.

But for most microenterprises, revenue will not be so easily verifiable. Investors must therefore rely on microenterprises recording and reporting revenue, coupled with occasional spot checks. This implies moral hazard, which can be mitigated by a combination of attempting to select business owners who are more likely to report truthfully, some threat of punishment, and incentives for reporting higher revenue. For example, Islamic lenders may rely on moral incentives for truth telling (e.g. Bursztyn et al., 2019). To the extent that successful repayment of the micro-equity contract provides a stepping-stone to additional financing, microenterprises may have incentives to report more truthfully in order to demonstrate business size and growth levels needed to qualify for further financing.

We believe this revenue observability problem is one that is likely to become less important over time as technological improvements reduce the share of cash transactions firms undertake and provide more scope for monitoring actual sales. This shift to the use of mobile payments is currently most prominently seen in China, where Alipay and WeChat Pay have replaced cash for most transactions in urban areas (Klein, 2019). In other countries, increasing use of debit and credit cards also enhances verifiability of firm revenues. IFC (2017) describes how banks are using other sources of data such as transactions deposited in banks, shipping records, e-commerce transactions, VAT returns, and other such data to make lending decisions. The growth in availability of these metrics is likely to offer investors more and more ways to get accurate signals as to the true revenue performance of firms.

Even after determining the royalty rate that yields a fair return in expectation, investors may still face challenges in receiving payments. Formal enforcement is difficult and prohibitively costly in most contexts.¹⁴ The same moral and dynamic incentive mechanisms that encourage truth telling about the level of revenue can create incentives for firm owners to repay. Investors may also find ways to use the reputational capital of entrepreneurs. If firm owners are chosen for investment through chambers of commerce or microfinance organizations to which they have social capital, failure to repay may be costly to their reputations with those organizations.

¹⁴ As we discuss in more detail below, we had to go through the pre-court arbitration process with six investees and file court cases against five investees of the pilot study.

However, in the absence of these incentives, the ability of the investor to enforce payment will depend on the legal environment for contract enforcement in their country.

3 A pilot in Sri Lanka

To understand how a micro-equity contract might work in practice, we worked with KCG Equity to carry out a small-scale, proof-of-concept, pilot in Sri Lanka. KCG Equity engaged a lawyer to design an actual contract that could be issued under Sri Lankan law, and was itself able to enter into partnership agreements with selected enterprises.¹⁵ The process began in 2012. We chose to work in Hambantota district. This is a relatively underdeveloped district in the south of Sri Lanka. The birthplace of the then-president of Sri Lanka, the government planned to transform the area into a new major urban hub. The first phase of a new port opened in 2010, and Sri Lanka's second international airport opened in March 2013. At the time, this area therefore seemed a promising area for growth-oriented microenterprises.

3.1 Selecting microenterprises

Given the scale of the pilot, we ruled out a business plan competition or competitive application approach. Together with KCG Equity, we met with both a local microfinance organization and the Hambantota Chamber of Commerce, and decided to partner with the chamber. The chamber has around 300 direct members (owners of small and medium-sized enterprises), a few large corporate members, and links with different trader associations. They had two programs that offered a promising pool of growth-oriented entrepreneurs who might be interested in equity investment. The first was a youth business program, in which they made loans of up to Rs. 200,000 (average size Rs. 75,000) to young business owners, for up to two loan cycles, with the goal of graduating them to other financing. The second was an entrepreneurship award program, where the chamber identified promising businesses in the district and gave several awards each year.

Our hope was that working through the chamber would help induce honest reporting of revenues and repayment. Entrepreneurs were asked to sign a contract in front of a witness from the chamber, and were told that their reputation with the chamber would be affected by any non-

¹⁵ The text of the Joint Venture Agreement was in formal legal language in the local Sinhala language and focused on the repayment of capital and revenue share components but also included standard legal clauses covering conditions that are common to such contracts. The text of the Agreement is available in the Appendix B.

payment. The signing of the agreement took place at the chamber itself before the chamber's lawyer who explained the legal obligations of the agreement to the investee and also undertook the legal registration work. Second, they were told that the ability of KCG Equity to make future investments in other businesses in the community would depend on their performance and repayments. Third, it was emphasized that keeping several years of revenue-sharing records would provide the necessary information to make a persuasive case to banks or other financial institutions for subsequent financing needs.

We conducted awareness programs for groups of candidate firms identified and invited by the chamber, and explained the details of the micro-equity contract. Interest in this financial product was fairly high; over 40 percent of the firms that attended the information sessions ultimately applied for an investment. Table 1 provides summary information on the nine firms in which investments were made. The owners are typically in their 30s, and all owners are male (KCG entered negotiations with a couple of female-owned firms, but they turned down the investment offers). The nine firms have an average age of eight years, have three employees, average monthly revenue of Rs. 420,000 (\$3,333), and average monthly profits of Rs. 71,000 (\$563). All of the firms were formal for tax purposes, having registered their businesses at the Divisional Secretariat. However, only one firm used an external accountant, with the remainder keeping records themselves.

Firms were typically interested in capital to buy specialized equipment that would allow them to expand their product range or improve the efficiency of production. For example, one firm specialized in vehicle repair. The owner wanted to import from Singapore a vehicle scanning machine costing Rs. 800,000. The machine would allow them to do automated scanning and repair of newer vehicles with electronic components. At the time of investment, there were no other repair shops in the area, and car owners typically had to travel to Colombo for such a service. A second example was a firm making yogurt and flavored ice packets. The owner sought an investment of Rs. 450,000 to buy a new ice drink packaging machine that would enable the business to produce ice packets of differing sizes and flavors, expanding his product range. In both cases the equipment does not have a local resale market, and there is risk involved in terms of whether the new investment will deliver the anticipated increase in revenue. Appendix A provides details for each of the nine cases.

3.2 Contracts and investments

Each contract was for 36 months, with an initial three-month grace period for fixed payments. The investments ranged from Rs. 250,000 to Rs. 700,000 (US\$1,984 to \$5,556), with an average investment of around Rs. 480,000 (\$3810). Firms were allowed to choose parameters in the contract within a restricted range of $0.5 \leq \delta \leq 1$ (so that firms would repay at least half of the equity investment) and $0 \leq B \leq 0.9$ (so that firms could not fully shield prior revenue levels from sharing). The revenue share, m , was then determined using the chosen δ and B and benchmarking against the prevailing interest rate of 18%. The investor used a spreadsheet to show firms the payment shares implied by different choices of δ and B . During the pre-contract discussions, firms were presented with alternative payment scenarios based on all possible alternative parameter combinations of $\delta = 0.5, 0.75, 1$ and $B = 0, 0.3, 0.6, 0.9$. When investees requested a different combination of parameters, the spreadsheet was recalculated and presented immediately. These demonstrations made it clear that the revenue share (m) would be higher the lower the portion of capital investment repaid in fixed payments (δ) and higher the proportion of prior revenues shielded from revenue-sharing arrangement (B). The investees sometimes requested, and were given, time (e.g., one week) to study the alternative plans arising out of the different parameter combinations. The local author was present at each of these individual investee discussions.

Table 2 shows that all but one firm chose $\delta = 1$, committing to buyback the entire investment with fixed payments. Their decision to use fixed payments may reflect a greater familiarity with debt contracts, and hence more comfort with a contract with a more even expected payment stream. Alternatively, noting that the choice of $\delta = 1$ minimizes the revenue share, this may reflect the entrepreneurs' optimism about future growth performance. The firms showed more variability in their choice of B , with five firms choosing not to shield any part of past revenues, and four firms choosing to shield between 30 and 90 percent of prior average revenue levels. However, four firms chose $\delta = 1$ and $B = 0$, the parameter combination resulting in the lowest revenue-share percentage (m). The resulting share of revenue to be paid, m , ranged from 0.29 to 5.85 percent. This was equivalent to a mean (median) of 8.2 percent (5.1 percent) of average monthly profits according to the profit data firms reported at the time of application. The entrepreneur's contract choices meant that they retained a relatively large share of the

incremental revenue stream, which has the advantage of lowering moral hazard concerns, but also perhaps suggests that our growth projections were conservative in their view.¹⁶

3.3 Contract performance

The nine investments totaled Rs. 4,310,000 (\$34,206). Table 3 summarizes the repayments for each investment. Firms reported less revenue than they had predicted, so that the total repayment due from revenue sharing was approximately Rs. 1.3 million less than the interest that would be paid on an 18% declining-balance loan over this period, with every single investment yielding less than the 30.1 percent nominal three-year return of such a loan. However, the larger problem was enforcement of repayment, conditional on the revenues that firms reported. Only two of the firms (the vehicle repair firm A, and the motor coil rewinding firm C) made all payments on time and yielded positive returns. A third firm (firm G) experienced some repayment issues, but was able to complete the payments required with some delays.

The remaining six firms all paid back substantially less than the capital invested. Four of the six paid their contractual revenue-sharing and principle payments for at least seven or eight months before falling into arrears. The other two firms fell into arrears before even making their first principle payment, and ended up paying only two months of principle repayments in total, and only a few months of revenue sharing. The three-year contracts ended between February and November 2016. At the end of the contracts, we had only received Rs. 2,259,383 (\$17,932) in total payments, yielding a return of -47.6 percent. The total amount outstanding was Rs. 2,501,929 (\$19,857).

KCG Equity sought to enforce repayment and chase up arrears during the contract period through multiple avenues. The first involved in-person visits to firms and discussions, and several review meetings with firms at the chamber of commerce, in the presence of chamber staff, and in one meeting, a lawyer. This led to some short-term improvements for some firms (e.g. one investee paid up several overdue payments on the day of the review meeting), but did not substantially change longer-term repayment. The chamber exerted some pressure, and denied a loan application to one firm that was behind on its payments. But overall, the chamber

¹⁶ We did not vary the expected return, however, and so at least for this pilot, did not induce firms to reveal information about expected returns in a manner that allowed us to capture a larger share of the investment gains.

appeared to have limited leverage. Investigating further options, KCG's experience highlights the difficulties in dealing with moral hazard issues in equity contracts, as compared with debt contracts. Lending institutions, including commercial banks, specialized banks, finance companies, and leasing companies, are able to obtain the credit history/report of any potential client from the Credit Information Management System (CRIMS), maintained by the Credit Information Bureau (CRIB) of Sri Lanka.¹⁷ KCG Equity learned that none of this legal/regulatory architecture is available for equity contracts. Further, there were no private collection agencies to which KCG Equity could sell the obligation.

Given this, KCG Equity next turned to the possibility of taking the defaulting firms to court, with the aim of demonstrating their seriousness and having a demonstration effect on any future investments. The first step was to go through a pre-court process of arbitration, where KCG has to present its case before a locally appointed arbitrator relevant to each investee's geographic area. KCG went through this arbitration process with the six firms that had not made their agreed payments. The arbitration arrangement was for firms to make an initial 25% payment of the balance due (in Jan 2017) and the rest in eleven installments over the course of the year (Feb-Dec 2017). However, only one firm made the initial 25% payment; three others made partial payments, and two firms refused to pay anything throughout the year. The arbitration process therefore yielded repayment of only 9.3 percent of the total balance owed, or Rs. 232,500 (\$1845).¹⁸

KCG Equity then decided to proceed with a filing of claims in court. The case had to be filed in the Hambantota District Court, and a representative from KCG Equity needed to be present at all hearings. KCG Equity is located in Kandy, six hours away from the courts, and firms could postpone hearings at the last minute. KCG Equity was told that if they were fortunate, the case might be settled in two or three court appearances, but that some cases could continue for 10 or more appearances. Moreover, even if KCG Equity were to receive a favorable ruling, investees might be able to show the court that they do not have sufficient income to pay. In that event, separate court orders would be needed to seize assets and sell them off to recover funding.

¹⁷ In 2009, the CRIB established a Secured Transactions Registry System, where information is maintained on any security interest that lenders may have against movable property, such as equipment or inventories.

¹⁸ As we discuss below, one investee reached an agreement to repay an additional Rs. 334,150 (\$2652) after the arbitration but before court filing.

The legal process began in March 2018 with a lawyer in Hambantota issuing Letters of Demand. This provides a small window of opportunity for settlement before proceeding with the case filing. KCG Equity reached an agreement with one investee to pay the total amount outstanding amounting to Rs. 334,150 (\$2652). This settlement agreement was honored over the course of a 10-month period. KCG Equity's lawyer proceeded with filing the remaining five cases, amounting to a total outstanding of Rs. 1,935,279 (\$15,359), in May 2018. Court hearings commenced in August 2018. By October 2019, all five cases had reached a court settlement on the repayment of funds due; the quickest case arrived at a settlement within six months, at the third court hearing, while the last case arrived at a settlement after 14 months, at the eighth hearing. The court settlements involved monthly payments in the Rs. 7,472—28,340 range over a period of 24-36 months. At the time of writing, these payments are still ongoing.¹⁹

3.4 What went wrong, and lessons for future micro-equity investments

This pilot only partially succeeded as a proof-of-concept. KCG Equity received principle repayments and state-contingent revenue sharing as agreed, with no enforcement problems, from three of the nine contracts. In a fourth case, KCG Equity received repayment of the principal and minimal revenue sharing after arbitration and the threat of litigation. This demonstrates that such contracts can work in practice. However, the overall portfolio made a loss, and experienced several problems.

We have only nine data points, so can offer only highly speculative observations on patterns in the data. Nevertheless, a few patterns are worth highlighting, using payments received before court filing as the basis of returns. First, our contract focuses on a share of sales, but the incentives of entrepreneurs may be affected more by the payments as a share of profits. Using base-year reported revenues and profits, the average (unweighted) royalty rate was just under 2 percent, but payments as a share of profits averages 8 percent. The realized return across the nine projects is correlated more closely with contract payments as a share of profits (-0.38) than with the share of revenues (-0.10). Second, the realized return was higher where the investment was a smaller share of initial capital stock. In the four enterprises that ultimately paid the KCG Equity investment averaged just under 11 percent of base-year capital stock. In the five enterprises that

¹⁹ If the investees fail to make payments as per the court settlement, then the legal recourse available to the investor would be to obtain a court order and police order and physically seize assets which would have to be liquidated to recover funds due.

at least partially defaulted, the average was 21 percent. Finally, all four of the enterprises that repaid chose to shelter some share of base-year revenues from the royalty payment (and hence, chose a *higher* royalty payment as a result), while none of those that defaulted chose to shield any base-year revenue. We speculate that these choices may have reflected unobserved intentions with respect to repayment. All of these observations are highly speculative, and should be read as such. But perhaps they offer some guidance for future attempts to enter royalty-based contracts.

As with any investment, external circumstances also affected returns. At the time of the investments, firms in Hambantota were expecting to benefit from the pending opening of a new seaport and airport in the city. However, neither of these infrastructure investments had the expected effects, at least partly because of the surprising election loss in January 2015 of locally born President Rajapaksa. The airport was subsequently described as the “world’s emptiest international airport.”²⁰ This highlights the importance of geographic diversification of investments to limit exposure to demand shocks.

The larger problem appears to be moral hazard due to the difficulties of enforcing contracts in a developing country legal environment. Part of this might be solved by better *ex ante* selection of firms to invest in, using some of the alternative methods discussed in Section 2.1. Part may be solved by dynamic incentives – perhaps making shorter and smaller initial investments, with successful completion opening the possibility for larger and longer-term investments or debt financing, or offering value-added services such as accounting advice. But ultimately, the contract will require a credible threat of enforcement. A small-scale investment fund seems likely to find this difficult, given the costs of using the legal system. Possible solutions could include such contracts being made by microfinance organizations that can tap into community enforcement mechanisms as well as rely on repayment histories, or for the investment fund to sign a contract with a third-party enforcer, who can be the residual claimant if the contract goes into arrears. Explicit penalty clauses for non-payment could be added to charge interest on arrears and lay out this process. Bundling the investment with accounting services that would provide some value to the enterprise and enhanced monitoring to the investor is also a possibility, if such services could be offered at low enough cost. Finally, there is also a role for

²⁰<https://www.forbes.com/sites/wadeshepard/2016/05/28/the-story-behind-the-worlds-emptiest-international-airport-sri-lankas-mattala-rajapaksa/#71c9acf87cea> [accessed 9 February, 2018].

government policy here: making it possible for non-repayment to be entered into a firm's credit registry record would increase the costs of default, while the process of arbitration and court settlement could be greatly improved. For example, small claims courts in many countries would allow for settlement to be rendered upon the first court appearance.²¹

A relevant question is whether these firms might have financed their planned investments through more standard debt contracts. We do not have a clear counterfactual on this question, so can only offer information based on conversations with the firms and the information obtained from them. It appears likely that in at least in two cases (cases A and B), the firms would have been able to access debt financing relatively easily, since there were recently opened bank branches that were actively approaching customers. Even in this environment, we believe that three cases (cases D, G and I) would have found it difficult to access loans because of existing debt obligations; another three cases (cases E, F and H) may not have fulfilled the lending criteria of banks (e.g., lack of collateral). One case (case C) had a strong antipathy toward using debt. This does indicate the need for alternative instruments, other than debt, for the financing of investments at the microenterprise level.

Note that we did receive some payment from all nine firms in which we made an investment, which differs from the venture capital type of equity investing. However, we did not have any superstar firms with very high returns that could help offset the losses on other investments. Here there is likely to be a trade-off between attempting to generate higher payments from each firm invested in (e.g. by basing m on historical revenue levels, rather than projected revenue levels, given the over-optimism of firms and the possibility of underreporting), and the potential for adverse selection, whereby firms with the highest growth prospects may not wish to receive investments that require them to share too large a share of their revenue growth. Further experimentation with the choice of our contractual parameters is needed.

4 Conclusions

KCG Equity invested Rs. 4.3 million, recovering Rs. 2.3 million in the planned three-year investment period and Rs. 2.8 million within five years. As an investment, the micro-equity

²¹ Another issue here is that courts tend to be more familiar with debt contracts, and so may be able to settle these more quickly. As equity contracts are relatively new, there is a role for the regulators as this market develops in establishing clear guidelines for courts on how to enforce such contracts.

portfolio was therefore a failure. However, as a proof-of-concept of the possibilities offered by the new contractual structure, as well as for learning about constraints to royalty-based investments, we view the pilot as, at least, a partial success. We believe the contract designed here has several attractive features that make it useful to other investors who are investing in situations where the selection, monitoring, and enforcement issues are easier. The results also help explain why the returns to capital may be so high in many microenterprises, since agency issues make it very difficult for outside investors to form joint ventures that share in these high returns. We see this as a first step in making such contracts more viable, and look forward to further experimentation in this domain.

We chose not to bundle the investment with any other input to the firms. However, given the particular challenge of obtaining true sales values, an interesting alternative would be to bundle the investment with outside accounting (and perhaps basic financial consulting) services. Since the costs of providing these services would need to be recouped in the royalty share, there is a trade-off between increasing the incentives for the entrepreneur to hide revenues (due to the higher royalty rate) and increasing the ability to monitor revenues. If the latter effect outweighs the former, then the share of true revenues reported to the investor would increase. In addition, the accounting services might also lead the firm to make better decisions and hence increase actual revenue, the largest share of which would accrue to the entrepreneur. With new technologies increasingly making it easier to monitor revenues in the future, and other sources of data becoming more prevalent, we do not see revenue observability as the main challenge to successful implementation of micro-equity in the future. Instead, the key challenges are likely to be selecting firms with high growth potential and enforcing repayment. While investors can take some steps toward better enforcement through the use of social capital, reputation, and dynamic incentives, there is also a role for government policy in allowing equity repayment records to enter into credit registries, and in improving the functioning of their courts.

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Table 1: Enterprises Selected for Pilot

| Enterprise Code | Business Sector | Owner Age | Owner Gender | Firm Age (years) | Number Employees | Monthly Revenue | Monthly Profits | Chamber Reference | Accounting done |
|-----------------|----------------------------------|-----------|--------------|------------------|------------------|-----------------|-----------------|------------------------------|--------------------|
| A | Vehicle repair (auto electrical) | 32 | Male | 8 | 7 | 524,931 | 78,739 | Award winner | Outside Accountant |
| B | Tyre sales | 37 | Male | 7 | 3 | 1,772,099 | 169,350 | Best agent award | Spouse |
| C | Motor coil rewinding | 59 | Male | 14 | 0.5 | 476,120 | 106,966 | Award winner | Self |
| D | Printer | 30 | Male | 6 | 3.5 | 192,576 | 92,081 | Award winner | Spouse |
| E | Vehicle painting | 37 | Male | 20 | 1 | 124,050 | 50,000 | Chamber recommendation | Self |
| F | Vehicle/boat servicing | 30 | Male | 7 | 1 | 43,225 | 29,642 | Award winner | Self |
| G | Yoghurt and flavored ice | 31 | Male | 5 | 4 | 273,376 | 43,458 | Completed Chamber Loan | Self |
| H | Coir and Rope | 31 | Male | 1 | 2 | 141,000 | 47,000 | Well performing Chamber Loan | Self |
| I | Processed fruit drinks | 34 | Male | 4 | 2 | 231,223 | 21,802 | Chamber recommendation | Self |
| Average | | 36 | | 8 | 3 | 419,844 | 71,004 | | |

Notes: number of employees does not include the owner. Part-time employees are counted as half a worker.

Monthly revenue and monthly profits are averages for the 12 months prior to application, and are in Sri Lankan Rupees

Best agent award was for best agent in Southern Province for a tyre distributor.

Table 2: Contracts and Investments

| Enterprise Code | Business Sector | Start date | Invested amount | Proportion of Equity to buy back (δ) | Proportion of prior revenue shielded (B) | Percent of revenue to be shared (m) |
|-----------------|----------------------------------|------------|-----------------|---|--|-------------------------------------|
| A | Vehicle repair (auto electrical) | 01-Mar-13 | 500,000 | 1 | 0.60 | 1.02 |
| B | Tyre sales | 01-Jul-13 | 700,000 | 1 | 0 | 0.29 |
| C | Motor coil rewinding | 01-Aug-13 | 250,000 | 1 | 0.60 | 0.71 |
| D | Printer | 01-Aug-13 | 500,000 | 1 | 0.30 | 2.26 |
| E | Vehicle painting | 01-Sep-13 | 500,000 | 1 | 0 | 2.04 |
| F | Vehicle/boat servicing | 01-Oct-13 | 500,000 | 1 | 0 | 5.85 |
| G | Yoghurt and flavored ice | 01-Oct-13 | 450,000 | 1 | 0.90 | 1.73 |
| H | Coir and Rope | 01-Nov-13 | 360,000 | 1 | 0 | 1.29 |
| I | Processed fruit drinks | 01-Dec-13 | 550,000 | 0.75 | 0 | 2.64 |

Table 3: Portfolio Performance

| Enterprise | Business | Repayment Due | | | Actuals Paid (end of contract) | | | Amount Due (at end of contract) | Arbitration Payments received (upto end 2017) | Litigation Payments received (upto Oct 2019) |
|------------------------|-------------------------------------|------------------|----------------|-------------|--------------------------------|--------------------------|--------------|---------------------------------------|---|--|
| | | Code | Sector | Capital | Revenue Share | Return if repaid (%)* | Capital | | | |
| A | Vehicle repair (auto electrical) | 500,000 | 113,124 | 22.6 | 500,016 | 113,119 | 22.6 | n.a. | n.a. | n.a. |
| B | Tyre sales | 700,000 | 108,113 | 15.4 | 106,060 | 37,161 | -79.5 | 664,887 | 50,000 | in process |
| C | Motor coil rewinding | 250,000 | 62,738 | 25.1 | 250,008 | 62,754 | 25.1 | n.a. | n.a. | n.a. |
| D | Printer | 500,000 | 51,494 | 10.3 | 137,753 | 22,107 | -68.0 | 391,650 | 57,500 | 334,150 |
| E | Vehicle painting | 500,000 | 46,184 | 9.2 | 155,621 | 11,779 | -66.5 | 378,800 | 95,000 | in process |
| F | Vehicle/boat servicing | 500,000 | 689 | 0.1 | 306,687 | 689 | -38.5 | 193,329 | 30,000 | 26,500 |
| G | Yoghurt and flavored ice | 450,000 | 44,139 | 9.8 | 449,785 | 44,343 | 9.8 | n.a. | n.a. | n.a. |
| H | Coir and Rope | 360,000 | 45,206 | 12.6 | 22,214 | 4,986 | -92.4 | 378,003 | 0 | in process |
| I | Processed fruit drinks | 412,500 | 117,060 | 21.3 | 25,000 | 9,300 | -93.8 | 495,260 | 0 | in process |
| Total / Average | | 4,172,500 | 588,747 | 13.7 | 1,953,143 | 306,239 | -47.6 | 2,501,929 | 232,500 | 360,650 |

Notes:

Arbitration agreement was for firms to make an initial payment of 25% of balance due, and remainder in 11 payments over the year.

Of the six firms with amounts outstanding at the end of the contract, four responded with some payment of funds due to arbitration.

Litigation process began with the issuing of Letters of Demand. One firm settled out of court at that time. The other 5 cases went through to court proceedings and came to an in-court settlement.

n.a. denotes not applicable, since no arbitration or litigation was needed with this firm.

Returns are calculated as repayments received as a percentage of amount invested, and are in nominal terms over three years.