Microenterprise Growth and the Flypaper Effect: Evidence from a Randomized Experiment in Ghana*

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Abstract

Standard models of investment predict that credit-constrained firms should grow rapidly when given additional capital, and that how this capital is provided should not affect decisions to invest in the business or consume the capital. We randomly gave cash and in-kind grants to male- and female-owned microenterprises in urban Ghana. For women running subsistence enterprises we find no gain in profits from either treatment. For women with larger businesses we strongly reject equality of the cash and in-kind grants; only in-kind grants cause growth in profits, suggesting a flypaper effect whereby capital coming directly into the business sticks there, but cash does not. The results for men also suggest a lower impact of cash, but differences between cash and in-kind grants are less robust. There is suggestive evidence that the difference in the effects of cash and in-kind grants is associated more with lack of self-control than with external pressure. JEL Codes: O12, O16, C93

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1 Introduction

There is a growing debate over whether aid is more effective when simply given as unrestricted cash compared to approaches such as conditional transfers which try to restrict how recipients use any money received (e.g. Baird et al, 2013; Goldstein, 2013; Khazan, 2013). Traditionally this debate has centered around food aid and education funding, but more recently this discussion has also arisen with respect to funding small businesses.Many microfinance organizations require clients to use their loans for business purposes (Karlan and Zinman, 2012). Other lenders go further to restrict the use of borrowed funds by providing the credit in-kind. For example, in Africa many lenders directly give fertilizer and other inputs to farmers instead of offering them cash to purchase the inputs they need. These restrictions for financing divisible and non-collateralizable working capital are a puzzle for classical economics: for example, in a Ramsey model profit-maximizing business owners should have an optimal level of capital investment. If lender restrictions force the owner to invest more than this amount, the owner should quickly liquidate the excess stock of capital. Any transaction costs incurred in doing so will only reduce welfare relative to an unrestricted cash loan. To the extent business owners face profitable investment opportunities, alleviating their credit constraints should yield rapid growth regardless of the form in which credit is provided.

The idea that 'money sticks where it hits' was dubbed the 'flypaper effect' by Arthur Okun, who originally used it to refer to the tendency of federal block grants to states and local governments to stimulate spending far more than theory would suggest (Hines and Thaler, 1995). Evidence for a flypaper effect at a household level, whereby income or transfers stick to the expenditure of the person receiving or earning this income has been found by Jacoby (2002) and Duflo and Udry (2004). At the individual-level, Choi et al. (2009) find a flypaper effect in how individuals allocate their pension portfolio, a finding which they attribute to mental accounting.

We test for a flypaper effect through a randomized experiment in Ghana. The design follows closely that used by de Mel et al (2008, 2012) in Sri Lanka, which to our knowledge is the only existing work to directly test cash versus in-kind grants for male and female businesses.[1] A sample of both female and male microenterprise owners who had no paid employees at the time of the baseline survey were randomly allocated into treatment and control groups. The

[1] McKenzie and Woodruff (2008) employ a similar design on a small sample of male microenterprise owners in Mexico. Several recent studies (e.g. Berge et al, 2011; Karlan et al., 2012) have also given cash transfers to existing businesses, often in combination with training, but none of them compare cash versus in-kind grants.

treatment group received grants of 150 Ghanaian cedis (approximately $120 at market exchange rates at the time of the baseline). As in Sri Lanka, half the grants were provided in cash and half in kind. For the in-kind treatment, the owner was asked to choose any equipment or materials they would like for their business that added up to this amount, and then were accompanied by a research assistant who directly purchased these items. The Ghanaian sample contains more than twice as many firms as in the Sri Lankan study, providing more power to distinguish the effects of providing capital in different forms. De Mel et al (2009a) find a lack of returns to capital in Sri Lankan female-owned microenterprises. Testing the impact of grants to women in Ghana, a developing country known for its vibrant tradition of female entrepreneurship (e.g. Hill, 1984), also enables us to see whether capital may be more successful in growing microenterprises outside of South Asia. Thus, the paper serves as more than a test of external validity for the Sri Lanka results. By using the different context and the larger sample, we have the power to focus more attention in our analysis on the differences in cash vs. in-kind treatments, and on differences by gender.

We find both similarities and differences with the Sri Lankan results. First, consistent with the earlier results, we find that average returns to capital are extremely high. On average, a grant of 150 GhC (about $120) increases monthly profits by about 25 GhC, a return of just more than 15% per month. When we split the sample by gender, we find large average returns for both males and females,[2] the latter result suggesting some differences with Sri Lanka. However, for females, we find that returns are positive only for women with baseline profits above the median. Among the sample of women with below-median baseline profits, those with more subsistence business, we find the grant has no effect. The subsample with below median profits in Ghana has characteristics which are very similar to the full sample of females in Sri Lanka. Hence, in both countries, we find that capital shocks have no effect on profits in subsistence enterprises owned by females. The women with more robust businesses earn high returns from the grants in Ghana; they are absent from the sample in Sri Lanka, consistent with differences in female labor force participation in the two countries.

[2] The high marginal returns to the capital shocks for males are consistent with non-experimental work in Ghana which has found evidence of high returns to capital for male-owned informal enterprises. Bigsten et al (2000) find much higher returns to physical capital than human capital in African small and medium scale manufacturing firms, Udry and Anagol (2006) find returns to be at least 60 percent per year among purchasers of used auto parts in Accra, and Schündeln (2006) finds strong evidence of financing constraints among small Ghanaian firms using a structural modeling approach.

Prior experiments in Sri Lanka (de Mel et al, 2008) and Mexico (McKenzie and Woodruff, 2008) are unable to reject equality of impacts of cash and in-kind grants, but lack power in comparing these alternative treatments.[3] In contrast, in Ghana we find strong evidence for a flypaper effect, with the return depending very much on the way in which the grant is delivered. High returns are generated only when the grant is delivered in-kind, a result which is particularly strong among females. The largest differences between cash and in-kind grants are in the sample of females with above median baseline profits. These are precisely the women who are not represented in the Sri Lanka sample. These results are not consistent with either a standard Ramsey model or with a variation of this model that incorporates time-inconsistent preferences. To explain a large difference in outcomes between cash and in-kind grants, we need a model with a flypaper effect, where the form in which capital arrives affects the extent to which it is invested in the business. We argue that a flypaper effect might arise if forcing the initial grant to take the form of equipment and inventories helps the entrepreneur resist pressures to divest. We examine two possible types of pressure: self-control issues caused by factors such as time-inconsistent preferences and high discount rates; and external pressure from others to share the additional capital. We find some evidence to suggest that the effect of the cash treatment is significantly more positive for individuals with the most self-control while the effect of the in-kind treatment is not significantly different. This suggests that handing out capital in kind helps entrepreneurs with a self-control problem keep the capital invested in the firm.

This interpretation is broadly consistent with work by Banerjee and Mullainathan (2010) and Duflo et al (2010) showing that self-control problems can result in individuals not undertaking productive investments today that have large payoffs in the future, and work by Schaner (2013b) who suggests that mental accounting helps explain why giving individuals a temporary boost to savings has a long-term effect on business growth. More broadly it contributes to a growing literature suggesting that behavioral factors may inhibit firm growth (e.g. Kremer et al, 2013, Hanna et al, 2012). But it contrasts with other results that emphasize external pressure: evidence from Anderson and Baland (2002) for Kenya and from Somville (2011) for Benin suggests that women seek to save outside the household in order to avoid contributing to household expenses; and findings by Brune et al (2013) in Malawi suggest that the reason for the success of a saving

[3] In Sri Lanka, although the point estimate for the return on the cash treatment is slightly larger than that on the in-kind treatment, one can also not reject that the in-kind treatment has twice the effect of the cash treatment at conventional significance levels.

commitment product is the desire to escape external pressure. In our urban environment such social pressures may be lower, especially for individuals who have self-selected into running microenterprises.

The remainder of the paper is structured as follows. In Section 2 we present the conceptual framework and testing strategy. Section 3 describes the experimental design and characteristics of our sample. Section 4 gives the basic experimental results, and explores heterogeneity by gender, treatment type, and randomization strata. Section 5 then asks what happens to the cash grants and what distinguishes the profitable from less profitable female businesses. Section 6 examines why the cash and in-kind treatments differ, and Section 7 concludes.

2 Conceptual framework and testing strategy

Our experiment involves giving a sample of microenterprises either an in-kind grant that must be spent directly on the business, or a cash grant which the owners can choose to spend how they like. We now consider what different theoretical models predict in terms of whether and when we might expect these two forms of grant to produce different impacts on business outcomes.

2.1 A Ramsey model without or with time inconsistency

In Appendix 1 we formally present a standard Ramsey model in which an entrepreneur decides how much capital, k, to invest in a business given their ability level θ, and financial asset holdings w. The model makes two assumptions which characterize the population of microenterprises we study: entrepreneurs cannot borrow and have to self finance (only 10 percent of our sample has ever had a formal loan); and heterogeneous ability is a complement to capital, which implies that entrepreneurs have different optimal firm sizes. The impact of a grant in this model depends on where a firm owner is relative to his or her steady-state. For firms that are already at their steady-state capital stock level (and hence not credit constrained), neither a cash nor an in-kind grant will have any long-term impact on capital or profits. For such firms, cash grants will also have no short-term effect (firm owners won't invest past their optimal capital stock level, which they already have), while an in-kind grant will result in a temporary increase in capital and profit until the household is able to liquidate the additional capital. The short-term return on the additional capital will be lower than the return on savings. In contrast, for a firm below its steady state level of capital, both a cash and an in-kind grant should be fully invested in the

business and have the same effect on profitability, reducing the time it takes the firm to reach its steady state level.

We then modify this model by introducing quasi-hyperbolic preferences as in Laibson (1997). In Appendix 1 we show that this changes the steady-state level of capital to a level lower than in the standard preferences case. However, given this new steady-state level of capital, the model has similar predictions to the Ramsey model in terms of the impacts of cash and in-kind grants. Firms which are at their steady state will consume cash grants and liquidate in-kind grants[4], while those which are below their steady-states will equally invest either type of grant and increase profitability. Thus introducing time-inconsistency into the model is not enough, by itself, to generate a sustained difference in the effects of cash and in-kind grants.

2.2 How can a flypaper effect arise?

To generate a flypaper effect for firms that have not yet reached their optimal size, a different theory is needed. This theory, whatever its micro foundation, must have the feature that in kind grants are not treated as fungible with cash grants. Let $\pi(k_t, \theta)$ be the profit of the firm in time period t, and r the market interest rate on savings. The law of motion of entrepreneurial capital k can then be written as:

$$k_{t+1} = k_t + \pi(k_t, \theta) - h_t \tag{1}$$

where $h_t \equiv c_t + w_{t+1} - (1 + r)w_t$ represents what is taken out of the enterprise either to be consumed (or given to others) c_t, or saved. In the Ramsey and time inconsistent models, the optimal choices of consumption c_t and savings w_{t+1} depend on total cash-in-hand $k_t + \pi(k_t, \theta) + (1 + r)w_t$. Unless k_t is illiquid, increasing k_t or π_t has the same effect on cash-in-hand and thus on h_t, k_{t+1} and π_{t+1}. In the more general case, $h_t = h(\pi_t, k_t)$ and asset integration requires that $h(\pi_t, k_t) = h(\pi_t + k_t)$.

If households regard k_t and π_t as not fungible, they are imperfect substitutes in $h(k_t, \pi_t)$ and there is no asset integration, i.e., $h(\pi_t, k_t) \neq h(\pi_t + k_t)$. A **flypaper effect** arises if $\partial h/\partial k \neq \partial h/\partial \pi$: the rate at which the household extracts funds from the firm is different from profit than for liquid capital. This simple observation forms the basis for our testing strategy

[4]Since the steady-state capital stock level is below the Ramsey steady-state, the marginal return to capital should be higher, and so the temporary increase in capital stock from a capital grant will have a higher return than the market interest rate, but only last for as long as it takes the owner to divest this grant.

for the difference between in-kind and cash grants.

There are several possible micro-foundations for $h(\pi_t, k_t)$, and hence several reasons for the existence of a flypaper effect. Transaction costs are one explanation: the cost of liquidating capital may deter investments that would be made with cash. This should matter less in the long-run, especially for working capital which over time is naturally liquidated and needs to be repurchased. A second possibility is mental accounting (Thaler, 1990): individuals who receive a cash grant may think of it as part of their income account, which they earmark for consumption and are free to spend; individuals who receive an in-kind grant think of it as part of their asset account which is earmarked as investment.[5] Mental accounting may simply be a heuristic device to reduce the complexity of consumption and investment decisions. If this is the cause, we might expect to find more of a difference between cash and in-kind grants for individuals with lower cognitive ability who may be in more need of heuristics to guide their investment choices.[6]

A third reason for a flypaper effect would be if assets k_t are less susceptible to internal pressure than profits π_t. Recall that self-control or time-inconsistency by itself is insufficient to generate a difference in response to cash versus in-kind grants. But self-control issues coupled with constraints to immediate use of inventories or equipment compared to cash can generate this difference. The physical constraint of the time taken to liquidate inventories or equipment may be enough to overcome immediate temptation pressures, akin to consumers using commitment savings products to help save (e.g. Ashraf et al, 2006). Alternatively, individuals who have self-control problems but are sophisticated in response to these may use mental accounting rules whereby they view cash and inventories as different mental accounts, making it mentally more costly to consume out of inventories. In such cases, we should expect more of a difference between cash and in-kind grants for those individuals with less self-control.

A fourth possibility is that pressure from household members works as a tax on the business with $\frac{\partial h}{\partial \pi} > \frac{\partial h}{\partial k} \geq 0$. Money tied up in inventories or equipment, being slightly less liquid, may be partly insulated from external pressure. A similar point is made by Schaner (2013a) for bank accounts. If successful, this tactic would yield a marginal tax rate on cash flow $\frac{\partial h}{\partial \pi}$ that is higher

[5] Another behavioral mechanism that could also lead to a flypaper effect is regret aversion, with individuals more likely to regret active decisions that turn out badly than passive decisions, which would lead to a bias against taking actions to convert capital to cash.

[6] Stanovich and West (2008) show based on a number of studies that individuals with lower cognitive ability (as measured by SAT scores) are more likely to use heuristics and display biases in a number of different tasks, but equally there are some other tasks in which they find no such correlation.

than the marginal tax on capital $\frac{\partial h}{\partial k}$. If the flypaper effect signals an effort to escape taxation of this kind, it is more likely to be observed among enterprises operated by more subordinate household members, such as married women. Anderson and Baland (2002) for instance show that women in urban Kenya join rotating savings and credit associations (ROSCAs) to shelter money away from their spouse. A similar result is reported by Somville (2011) for Benin. de Mel et al (2009a) suggest women may inefficiently over-invest in less liquid forms of business assets in order to resist spousal pressure.

Pressure to redistribute resources can also be exerted from outside the household. Platteau (2000) introduces the idea of sharing norms to economics from anthropology. He notes that in many developing countries, especially in sub-Saharan Africa, individuals often live in large households and have strong links to extended family and kinship networks. Social sharing norms can make it hard for individuals to save and invest, as they are forced to share additional resources with others.[7] These sharing norms can vary according to the source of income and how it is stored. Evidence of external pressure to redistribute has been documented by numerous authors.[8] Much of this evidence, however, comes from rural societies where the enforcement of sharing norms can occur through repeated social interaction between a small set of individuals. Social pressures may be weaker in urban environments like ours.

A natural question is why individuals who receive cash and are aware of external pressure don't quickly convert this into inventories or equipment to help insulate themselves from this pressure. There are at least two reasons why they might not be able to do this completely. First, while business owners were told they had won the cash grants at their home or workplace, and not in a public location, there is often a family member around who may observe them receiving this grant. Second, even if they are not observed, social norms and mental accounts may dictate that a positive income shock must be shared with others, whereas there is no such expectation for sharing business working capital.

Finally, in contexts where NGOs are giving out grants in-kind, a flypaper effect might arise if recipients believe they need to keep the money in the firm to please the NGO and possibly

[7] Szabo (2012) considers the converse case, using data from urban Ghana to show that, in some circumstances, family networks can be an important form of finance for small firms.

[8] E.g. Duflo and Udry (2004), Charlier (1999), di Falco and Bulte (2009), Baland et al (2011), and Jakiela and Ozier (2012). However, Grimm et al (2010) offer a more mixed picture, finding in seven West-African countries that local social networks within the city actually have a positive association with business performance, whereas there is a negative association between business performance and a smaller distance to the village of origin.

receive future grants, or because they see this as a signal that the NGO believes their business has scope for growth. In our context such mechanisms should be weaker given that the grant was framed as a prize for participating in a survey.

2.3 The Impact of Cash and In-kind Grants with a Flypaper Effect

In the presence of a flypaper effect, cash and in-kind treatments have systematically different effects. To illustrate, consider the simple case where individuals do not consume out of working capital, but only from profits ($\frac{\partial h}{\partial k} = 0$ but $\frac{\partial h}{\partial \pi} > 0$), and thus $h(\pi_t, k_t) = h(\pi_t)$. A steady state firm size k^v is defined as a capital stock that satisfies:

$$\pi(k^v, \theta) = h(\pi(k^v, \theta))$$

To fix ideas, consider a linear function of the form $h_t = a\pi_t + b$ with $0 < a < 1$. The law of motion of capital becomes:

$$k_{t+1} = k_t + (1 - a)\pi(k_t, \theta) - b \tag{2}$$

which resembles a Solow model with a negative drift term b. Provided that the marginal return to capital is high enough at low values of k, difference equation (2) has two equilibria: a high, stable equilibrium k^v_{high} similar to the steady state of a Solow model; and an low, unstable equilibrium k^v_{low} below which the firm closes down. For k such that $k^v_{low} < k_t < k^v_{high}$, the firm is growing. For $k < k^v_{low}$, the firm is unstable and eventually disappears – and is thus unlikely to be part of our sample. Equation (2) can then be rewritten to accommodate cash and in-kind grants M_t and E_t, respectively:

$$k_{t+1} = k_t + E_t + (1 - a)(\pi(k_t, \theta) + M_t) - b$$

For initial values of k such that $k^v_{low} < k_t < k^v_{high}$, the in-kind treatment E_t has a one-for-one effect on capital stock k_{t+1} – the flypaper effect – but the cash treatment only has a $1 - a$ effect on k_{t+1}. As a result, the cash treatment will have less impact on profits than the in-kind treatment for firms below steady-state. Turning to long-term predictions, if the firm was below its equilibrium size k^v_{high}, the in-kind treatment speeds up convergence to the steady state k^v_{high}, while the cash treatment takes longer to reach this steady state (and if $a = 1$, does not help at all in reaching this). If the firm was at – or above – equilibrium size k^v_{high}, decreasing returns in

capital imply $\pi(k_t, \theta) - h_t < 0$ and the firm should decapitalize the in-kind treatment E_t.[9]

The above example can be generalized to allow h_t to depend on both π_t and k_t. For instance, let $h_t = a\pi_t + \eta k_t + b$ with and $0 < \eta < 1$. The no-closure stable steady state k^w is the (highest) value of k that solves:

$$(1-a)\pi(k^w, \theta) - b = \eta k^w.$$

It follows that equilibrium firm size is a decreasing function of both a and η. The in-kind treatment has a $1-\eta$ effect on k_{t+1} while the cash treatment has a $1-a$, also less-than-one-for-one, effect on k_{t+1}. Asset integration requires that $a = \eta$. If investing in inventories and equipment is more successful as protecting the capital of the enterprise, we should observe $a > \eta$. This forms the basis of our testing strategy.

2.4 Testing strategy

We estimate models of the form:

$$\pi_{i,t+s} = \beta_1 M_{it} + \beta_2 E_{it} + u_{i,t+s} \tag{3}$$

$$k_{i,t+s} = \alpha_1 M_{it} + \alpha_2 E_{it} + v_{i,t+s} \tag{4}$$

where t is the time of treatment, $\pi_{i,t+s}$ is the profit of entrepreneur i at time $t+s$ after treatment, $k_{i,t+s}$ is the capital stock, M_{it} and E_{it} denote cash and in-kind grants, respectively, and $u_{i,t+s}$ and $v_{i,t+s}$ are error terms. Coefficients α's and β's are the average effects of each of the two treatments on capital stock and profits, respectively, across the population of firms in our sample.

The standard Ramsey and $\beta\delta$ models predict $\alpha_1 = \alpha_2 > 0$ and $\beta_1 = \beta_2 > 0$ if the firm was below its steady state at the time of the treatment. They also predict $\alpha_1 = \beta_1 = 0$ if the firm had already reached its equilibrium size at time t. Because the in-kind treatment is not immediately fungible, these models also predict $\alpha_2 > 0$ and $\beta_2 > 0$ for a short time since treatment but eventually $\alpha_2 = \beta_2 = 0$ as k returns to its steady state from above.

In contrast, the model without asset integration makes predictions that depend on the form taken by the external pressure function $h(.)$. As argued in the previous sub-section, when firms

[9] In the special case where $h(\pi) = b$ and initial capital $k_t < k^v_{low}$ but $k_t + E_t + (1-a)\pi(k_t, \theta) - b > k^v$, the in-kind treatment pushes the firm above the minimal threshold size and ensures its long term survival. In the special case where $h(\pi) = \pi$, there is hysteresis: the in-kind treatment pushes the firm to a new equilibrium level of capital $k_t + E_t$ in which future profits are higher but there is no further addition or subtraction to capital after $t+1$.

are at or above steady state, the marginal return to business capital is low. Consequently, even recipients of the in-kind treatment wish to take the capital out of the business. Hence there should be no difference with the response to the cash treatment for this category of entrepreneurs: in both cases, the capital grant will not 'stick'.

When firms are below steady state, there is a tension between what is best for the business and what internal and external pressures are demanding. If receiving the capital grant in kind helps the entrepreneur resist these pressures more successfully, we expect to observe a flypaper effect for in-kind grants, resulting in a higher growth in profits and capital stock, whereas the cash treatment has less effect. In contrast, asset integration requires that $\alpha_1 = \alpha_2$ and hence that $\beta_1 = \beta_2$.

We have discussed three main reasons why a flypaper effect may arise: simple heuristic mental accounting, in which case the difference between cash and in-kind should be greatest for those with lower cognitive capacity; internal pressure driven by self-control problems, in which case this difference should be greatest for those with less self-control; and external pressure from household and family members, in which case the difference should be greatest for those facing most external pressure. We examine the channel through which a flypaper effect operates by testing treatment heterogeneity with respect to these factors.

3 The Experiment

3.1 The Sample

We purposively chose urban Ghana as the setting for this study. The choice of Ghana was motivated by the desire to provide evidence in an African context, in a country known for a history of involvement of women in business which provides a setting that is conducive to female business success. Women in Ghana have similar labor force participation rates to men, and are more likely to be self-employed. Evidence of this is seen in data from the 2000 Ghanaian Census: the labor-force participation rates for 15-60 year olds are 69.6 percent for females and 73.9 percent for males, and in urban areas 45 percent of females are non-agricultural own-account workers, compared to 33 percent of males. This contrasts sharply with Sri Lanka, the setting for the experiment in de Mel et al (2008, 2009a), where only 7.8 percent of prime age females are self-employed, compared to 29.7 percent of prime age males.

Within Ghana we chose Accra, the capital and largest city, and the nearby industrial city of

Tema. A sample of microenterprises was then constructed as follows. First, enumeration areas (EAs) were selected with probability proportional to the number of households in these EAs according to the 2000 census. We randomly selected 70 EAs in Accra and 30 in Tema. Then, to reduce the costs of listing, we subdivided EAs into equal areas, such that each area would contain approximately 70 to 80 households. This typically required dividing an EA into half or thirds. One of these areas was then randomly selected from each EA. Enumerators went door to door in this area to carry out a screening survey of each household. Households were screened to identify those with an individual aged 20 to 55 who was self-employed and working 30 or more hours per week in a business with no paid employees and no motorized vehicle. These criteria were used to select full-time microenterprise owners who were not so large that the grants in our experiment would have little effect.

The gender and business sector of all individuals passing this screen were then recorded. This resulted in screening 7,567 households to identify 3,907 individuals who passed the screen. Only 19.4 percent of these individuals were male, showing the predominance of women among small enterprise owners in urban Ghana. Based on the gender mix of self-employed in these industries in the 2000 Census, we classified business sectors into male-dominated industries, identified as construction, repair services, manufacturing, and shoe making and repair; female-dominated industries, identified as hair and beauty care, and food and restaurant sales; and mixed industries, identified as trade and retail, and sewing and tailoring. These industries cover the vast majority of the industries in which the self-employed work in Ghana. The 4.6 percent of those screened who worked in other industries such as communication services, pharmacy, photography, fishing, and agriculture were not included in the sample.

Our aim was then to arrive at a sample of roughly 900 baseline firms stratified by gender and sector. In order to minimize the spillover from the treatments to be carried out, we limited the sample from each EA to no more than 5 males in male-dominated and 5 males in mixed industries, and no more than 3 females in female-dominated and 3 females in mixed industries. We also ensured that only one individual was chosen from any given household. This resulted in an initial sample of 907 firms, consisting of 538 females and 369 males. A baseline survey of these firms was conducted in October and November 2008 (see the timeline in Table 1). The firm owners were asked for details of both their firm and their household.

A second pre-treatment survey of these firms was conducted in February 2009. The purpose

of a second pre-treatment round was to eliminate firms most likely to attrit.[10] This left a final sample for the experiment of 793 firms, comprising 479 females (248 in female-dominated industries and 231 in mixed industries) and 314 males (146 in male-dominated industries and 168 in mixed industries).

3.2 Experimental design

The design of the experiment closely followed that used in Sri Lanka by de Mel et al (2008, 2009a). Firms which completed the first two survey rounds were randomly allocated into three groups: a control group of 396 firms, a treatment group of 198 firms which would receive 150 Ghanaian cedis (approximately US$120 at the time of the baseline) in cash which they could use for any purpose, and a treatment group of 198 firms which would receive 150 cedis in equipment, materials, or inventories for their business. In the case of the in-kind treatment, the equipment or materials were selected by the firm owner and purchased directly by our research assistants with the owner. Recipients of in-kind grants were free to purchase any item suitable for their business and were not given any advice about what to purchase.

The majority of the in-kind treatments were chosen in the form of inventories to sell (e.g. beauty care products, electronic goods, alcohol, food) and raw materials (e.g. wood, sandpaper, cloth, oil and other cooking ingredients, shampoos and supplies for beauty salon use). Only 24 percent of those receiving the in-kind treatment elected to buy physical equipment, with the most common equipment purchased being sewing and knitting machines by tailors, hair dryers by owners of beauty salons, and drills and other carpentry equipment by firms in woodwork. Males were more likely to get some equipment with this treatment than females (33 percent versus 19 percent). With the cash treatments, firm owners were notified that they had won a cash prize for participating in our survey, and then received the cash through money transfer at a local bank or in-person.

Our theory shows that the response to the in-kind grant can depend on how quickly the grant can be liquidated if it takes firm owners above their desired steady state capital stock. There are at least three reasons to think the grants could be liquidated rapidly. First, and most importantly, firm owners had free choice on what to buy for the business with the in-kind

[10] In particular, 55 of the initial 907 firms could not be found on at least three attempts, 15 firm owners refused this second round, 24 firm owners were no longer operating a business, and 20 firms that did not provide details on their firm profits, expenses and sales were eliminated.

grant, so those who knew they would want to liquidate it quickly could have chosen capital they knew they could sell rapidly. Second, as noted above, most of the in-kind treatments were used to purchase inventories and raw materials to sell. The grant size of 150 cedis compares to a mean (median) monthly raw materials purchase of 595 (160) cedis for the control group in our first pre-treatment survey round. So even without increasing sales, firms with at least median activity levels should have been able to liquidate grants within a month. Finally, even firms who chose to purchase equipment were purchasing basic equipment used by many businesses in the area, for which there is a vibrant resale market.

We randomly selected when firms would receive their grant, staggering the timing of the grants, so that 198 firms were assigned to receive the grants after the second round, a further 181 firms assigned to receive the grants after the third round, and 18 firms were assigned to receive the grants after the fourth round. This staggering was done both for the purpose of managing the logistics of making these grants, and to provide incentives for firms to remain in the study for multiple rounds since they were told more grants would be given out after rounds 3 and 4. All grants – in cash and in kind – were framed to firms as prizes to thank firms for participating in the survey. Participants in the survey were told that we were undertaking a study of small firms in Ghana, and that some of the firms would be randomly chosen to receive prizes as a token of our appreciation for their participation in the survey. Firms which were selected in either treatment group were not told they had been selected for a prize until the time their prize was being given out.[11]

Randomization was done via computer after the second round of data was collected. Firms were first stratified into 16 strata on the basis of gender and sector (males in male dominated industries, males in mixed industries, females in female-dominated industries, and females in mixed industries); baseline capital stock (above or below the raw baseline median of 181 cedis in capital stock); and on a binary variable called "high capture". In the second survey round, firm owners were asked on a 5 point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) to assess how strongly they agreed or disagreed with the statements "Whenever I have money on hand, my spouse or other family members always end up requesting some of it", and "People who do well in their business here are likely to receive additional requests from family and friends for money to help out with some expense or another". We summed the responses

[11] We believe it unlikely that firms in the control group delayed investments in the hope of winning. In the event that such an effect occurred, it should be short-term, and our longer-term follow-up helps rule this out.

to these two questions, and classified as "high capture" firm owners with scores of the median of 8 or above – that is if on average they agree with both statements.

Then within each strata, we ranked firms according to January 2009 reported profits (collected in the second round survey), and formed matched quadruplets of firms. We used wave 2 rather than baseline profits for the match since 9 percent of the firms did not report round 1 profits. Within the quadruplet one firm was then randomly chosen to receive the cash treatment, one to receive the in-kind treatment, and two to be control firms. We then randomly selected which quadruplets would receive their treatments after each round. In the end this resulted in the 793 firms being matched into 195 groups, of which 4 groups ranged in size from 5 to 8 firms and the remainder were quadruplets.

This randomization design was based on the analysis in Bruhn and McKenzie (2009) who showed the potential for significant increases in power and baseline balance from matched pairs (with a single treatment group) and stratification compared to simple randomization. The variables used for stratification were motivated by the results in de Mel et al (2009a). In particular, we stratified by gender and industry since the ex post heterogeneity analysis in that paper found strong differences by gender, and some suggestion of differences according to whether women were working in female-dominated versus mixed industries. The choice of "high capture" as a stratifying variable is motivated by the literature referenced earlier that has suggested that many individuals who succeed in raising their incomes face large demands from others to share it. Stratification on baseline capital stock was done both because this was believed to be a variable that would be correlated with future profits, and to allow for testing potential heterogeneity in treatment effects for smaller and larger microenterprises. Matching of quadruplets on profits was done to achieve greater balance on the pre-treatment value of the main outcome of interest as well as to investigate treatment heterogeneity in this dimension. It also enables us to eliminate quadruplets with outlier values of pre-treatment profits and still be assured of balance and random allocation to treatments and control among the remaining sample.

3.3 Data collection and description of firms

The two pre-treatment survey rounds were followed up by four additional quarterly survey waves in May 2009, August 2009, November 2009, and February 2010. Of the 793 firms which completed the first two rounds, 730 answered the final wave survey. Appendix 2 (and tables A1

and A2) details wave by wave attrition rates and shows the robustness of our main treatment effects to corrections for attrition. A longer-term follow-up survey approximately three years after treatment was conducted in March 2012, and was able to locate 86 percent of the firms, with 72 percent surviving and reporting profits. We use the first six rounds for the majority of the paper, but use the last round to provide some longer-term treatment impacts.

Each follow-up round collected data on changes over the quarter in fixed capital from purchases, sales or repair; the current value of inventories and raw materials, and the value of the last month's expenses, sales, and profits. The most important firm outcome variable measured is firm profits. Profits were elicited via a direct question, following the recommendations of de Mel et al (2009b). Firm owners were asked: "After paying all expenses, what was the income of the business (the profits) during the last month? (Consider all expenses, including wages of employees but not including any income you paid yourself as an expense)".[12] This definition of profit thus includes the return to the entrepreneur's labor and managerial talent. Nominal profits were converted to October 2008 real profits using the Greater Accra region Consumer Price Index collected by the Ghana Statistical Service.

Table 2 summarizes the basic characteristics of firms and their owners in our experimental sample, and compares the pre-treatment characteristics of firms in the control group to those assigned to either treatment group. The top of the table shows balance for the characteristics used for stratification or matching, while the remaining rows compare the characteristics of other variables of interest. Mean (median) monthly profits in January 2009 were 130 (68) cedis, and mean (median) capital stock at the same point in time was 452 (172) cedis. The grants of 150 cedis were therefore approximately equivalent to two months' profits and almost equal to the size of existing capital stock for the median firm. However, since we did not explicitly cap profits or capital stock when selecting firms into the experimental sample, there are a small number of firms with much higher levels – the maximum profit reported in our pre-treatment waves is over 5000 cedis per month. The inclusion of these few larger firms does not have much effect our basic results, but has a larger effect on our analysis of treatment heterogeneity. As discussed below, we therefore focus most of our analysis involving heterogeneity of treatment response

[12] An innovation in this experiment was the use of computerized cross-sectional and panel consistency checks. Data was collected using PDAs, and a consistency check was triggered whenever reported profits exceeded reported sales in the cross-section, whenever a firm reported sales but not profits, and whenever the change in profits from one quarter to the next exceeded a pre-specified threshold. We discuss these consistency checks in more detail in Fafchamps et al (2012), where we show that they lead to some improvements in data quality.

on the firms in quadruplets which have baseline profits of 1500 cedis per month or less. Since randomization occurred within quadruplets, balance on baseline characteristics is achieved for this subsample also.

Table 2 shows that overall the two treatment groups look similar to the control group in terms of pre-treatment characteristics. The only exceptions are October/November 2008 profits and January 2009 sales, which show significant differences across treatment groups in the trimmed sample, and differences in magnitude, if not statistical significance, in the full sample. Recall the matched randomization used the wave 2 profits. However, the correlation between wave 1 and wave 2 profits is only 0.19, compared to a correlation of 0.58 between wave 2 and wave 3 profits, and of 0.72 for the control group between waves 5 and 6 (which is the same seasonality as between waves 1 and 2).[13] Imbalance on this baseline profit measure is thus unlikely to imply imbalance on follow-up profits, particularly given the pre-treatment balance on wave 2 profits (Bruhn and McKenzie, 2009). Nevertheless, we will show our results are robust to the use of firm fixed effects which account for any baseline imbalances.

As seen in Table 1, the mean owner in our sample is 36 years old, has almost 9 years of schooling, and has been running the firm for 7 years. The majority of firms are run out of the home, with 83 percent of women and 69 percent of men operating a business from their dwelling. Most firms are not registered for taxes, and only 10 percent have ever had a loan from a bank or microfinance institution. Half of the firm owners use a susu collector, with this more common among women (58 percent) than men (34 percent).[14]

4 Estimation of Experimental Treatment Effects

Only nine firm owners assigned to receive a grant (2% of those assigned to treatment) did not receive one. One of these firm owners had died, three women refused the grant saying their husbands would not let them accept it, and the other five firms had attrited from the survey

[13] The correlation between round 1 and round 2 is 0.49 for the trimmed group. The round 1 data have more missing values and are noisier for several reasons: the enumerators sometimes accepted ranges instead of pressing owners for exact numbers; we did not have the PDA panel consistency checks to check these numbers against previous rounds; and it can take time for both the firms and enumerators to learn what is being asked. See Fafchamps et al (2012) for more discussion of these measurement issues.

[14] A susu collector is an informal mobile banker, who typically collects a savings deposit daily from individuals and returns them at the end of the month after subtracting one day's deposit as a fee. That is, saving is at negative interest rates in exchange for safekeeping.

and could not be located to give them the grant. Given this, we focus on intent-to-treat effects, which show the impact of being randomly assigned to receive the grant – in practice there is little difference between the intent-to-treat effect and the treatment on the treated effect of actually receiving the grant given that compliance is almost 100%.

4.1 Impact on Profits by Grant Type and Gender

Figures 1 and 2 graphically show the main results of the experiment by displaying the empirical cumulative distribution functions (CDFs) of real profits by gender and treatment group for the final two main rounds of the survey, 9 to 12 months post-treatment. For males, Figure 1 shows that both the in-kind and cash treatments have distributions to the right of the control distribution, with separation over most of the range of profits. The in-kind and cash treatments have similar distributions up to about the 80th percentile, and then separate with the distribution of profits for the in-kind treatment lying to the right of the cash treatment profits distribution. In contrast, the distribution of real profits by treatment group for females shows two noticeable differences from that of males. First, the distribution of the cash treatment group lies right on top of that of the control group, suggesting no impact of the cash treatment on profits. Second, while the in-kind distribution lies to the right of the other two groups, this separation only occurs at about the 50th or 60th percentile. That is, for women, there is a flypaper effect but it only affects the top half of the distribution.

We then estimate the average impact of the cash and in-kind grants on firm profits. We begin by using our first six waves of data, pooling together male and female business owners, and running an OLS regression of the form:

$$\pi_{it} = \beta_1 M_{it} + \beta_2 E_{it} + \sum_t \delta_t D_{it} + \sum_{g=1}^{G} \gamma_g S_{ig} + \varepsilon_{it} \tag{5}$$

where M_{it} and E_{it} are dummy variables indicating whether firm i has been assigned to receive either the cash or in-kind treatment by time t. The error term u_{it} has been decomposed into wave fixed effects D_{it}, quadruplet fixed effects S_{ig}, and a residual ε_{it}. The G quadruplets are the strata used in the randomization of the two treatments across entrepreneurs.

We test whether either treatment is significantly different from zero. We also test the equality of effects of the two treatments $\beta_1 = \beta_2$. We estimate equation (5) for the full sample, and then for the sub-sample which trims out matched quadruplets which have a firm with pre-treatment

profits above 1500 cedis.[15] In addition to OLS estimation conditional on group dummies, we also estimate equation (1) via individual fixed effects. The inclusion of fixed effects controls for any time invariant small-sample differences between treatment groups. We cluster errors at the firm level in all specifications.

The first four columns of Table 3 show the treatment effects for the pooled sample. All four specifications show a large positive impact of the in-kind treatment on firm profits. Monthly firm profits are estimated to be 31-43 cedis higher as a result of the 150 cedis in-kind treatment. The cash treatment is significant at the 10 percent level in the untrimmed OLS specification, but becomes insignificant when trimming or using fixed effects. The coefficients are always much smaller than for the in-kind treatment, and we can reject the absence of a flypaper effect at the 5 percent significant level for three out of four specifications and at the 10 percent level for the other. That is, cash grants have less impact on business profits than in-kind grants.

These initial results pool together all six initial waves of the survey, thereby giving the average impact of the treatments over the observed time period and improving power (McKenzie, 2012). We observe firms at quarterly intervals, up to 12 months after treatment. Appendix 3 tests robustness to allowing the impact of the grants to vary with the time since treatment, and tests for equality of treatment effects. There is some suggestion that the impact of the in-kind treatments are greater 9-12 months after treatment than immediately afterwards, but we reject equality of treatment effects over time at the 10% level only for the in-kind treatment for females, and then only with a fixed effects specification. Given the sample sizes we have and lack of strong evidence to reject pooling, we therefore continue to pool all six waves for the remainder of the paper, while using the seventh wave to look at longer-term effects in a later section.

In the remainder of Table 3 we allow the impact of the grants to vary by gender. Recall the randomization was stratified by gender. We modify equation (5) to allow both the treatment

[15] Only 7 firms have pre-treatment profits above this level, but this trimming involves dropping 28 firms (1% of the sample) since we need to drop other firms in the matched quadruplet. Doing this ensures that balanced randomization occurred within the trimmed sample, and prevents a few firms with scale well above the rest of the sample exerting undue influence on the results. Appendix Tables A6-A8 show results are typically similar on the full sample without this trimming.

and wave effects to vary by gender:

$$\pi_{it} = \beta_1 F_i M_{it} + \beta_2 F_i E_{it} + \beta_3 (1 - F_i) M_{it} + \beta_4 (1 - F_i) E_{it} + \sum_t \delta_t D_{it} + \sum_t \delta_t^F F_i D_{it} + \sum_{g=1}^{G} \gamma_g S_{ig} + \varepsilon_{it} \quad (6)$$

where $F_i = 1$ if entrepreneur i is female, and 0 otherwise. Columns 5 and 6 estimate equation (6) by OLS with quadruplet dummies, and columns 7 and 8 with individual fixed effects. Finally, columns (9) and (10) restrict the OLS estimation to the last two waves of data. This corresponds to the data in Figures 1 and 2.[16]

For women, the estimated treatment effect of the cash grant is always small (5 cedis or less) and statistically insignificant, whereas the treatment effect of the in-kind grant is large (35-50 cedis) and statistically significant. In all specifications we can reject equality of the cash and in-kind treatment effects. This confirms what is seen visually in Figure 2, that only the in-kind grants have a significant effect for women. For males, the in-kind treatment effect is also large, although more sensitive to specification, ranging in size from 28 to 60 cedis, and statistically significant in all but one specification. After trimming, the magnitude of the in-kind treatment effect for males is very similar to that for females, and we cannot reject equality of in-kind treatment effects by gender in any specification. In contrast to females, we can never reject equality of cash and in-kind treatment effects for males, despite the point estimates always being smaller for the cash than the in-kind treatment.

The cash treatment effect for males is statistically significant and large when we restrict analysis to waves 5 and 6, which is consistent with the effects seen in Figure 1. However, using all waves of the data, the estimated impact varies between 5 and 29 cedis depending on specification, with large standard errors. The impact of cash is larger using OLS than fixed effects because of the slight imbalance in wave 1 profits for males. The group assigned to the cash grant has higher wave 1 profits (despite the same wave 2 pre-treatment profits) than either the control group or the group assigned to the in-kind treatment. Because we balanced on wave 2 profits in the randomization, the imbalance is due to chance. It is therefore not clear whether or not one should control for this pre-treatment difference. If we are prepared to treat this chance imbalance as noise and not condition on it, then there is some evidence for a significant cash

[16] Readers may be concerned that profits are artificially high in the quarter immediately after the equipment treatment if firms receiving inventories to sell count this as pure profit. Focusing on these two rounds which are six months or more removed from almost all the treatments shows this concern is not driving our results.

effect, at least in the last two rounds. But the confidence interval for the male cash treatment effect when we do control for it with fixed effects is (-26.5, +36.7), indicating that the data really have no information about the cash treatment effect for males when we condition on this difference.

4.2 Treatment Heterogeneity by Randomization Strata

Next we examine treatment effect heterogeneity according to the other variables used for stratification and matching. We do this separately by gender, given the differences observed above. Let A and B denote the two categories of a binary variable used for stratification (e.g. $A_i = 1$ if i works in a single-sex dominated industry, and $B_i = 1$ if i works in a mixed-gender industry). Then we estimate separately for each gender:

$$\begin{aligned}\pi_{it} =&\beta_1 A_i M_{it} + \beta_2 A_i E_{it} + \beta_3 B_i M_{it} + \beta_4 B_i E_{it} \\ &+ \sum_{t=2}^{6} \delta_t D_{it} + \sum_{t=2}^{6} \delta_t B_i D_{it} + \sum_{g=1}^{G} \gamma_g S_{ig} + \varepsilon_{it} \end{aligned} \tag{7}$$

The results are shown in Table 4. The top two rows of the table show the categories A and B which define strata. Columns (1) and (2) show the OLS and fixed effects estimates of treatment heterogeneity by the gender mix of the industry firms work in. De Mel et al (2009a) found some evidence in Sri Lanka that the impact of grants was less for women in female-dominated industries than those in mixed industries. In Ghana, panel A of column (2) shows that with fixed effects, the cash treatment has a -6.9 cedis effect in female-dominated industries versus a 1.8 cedis effect in mixed industries, and the in-kind treatment has a 25.4 cedis effect in female-dominated industries compared to a 39.8 cedis effect in mixed industries. The point estimates are therefore consistent with the idea that the grants may have more effect on the businesses of women who operate in mixed industries. However, the differences in treatment effects by industry category are not statistically significant. Likewise panel B shows no significant heterogeneity by industry category for men.

Columns (3) and (4) examine heterogeneity according to the baseline measure of capture. Recall that individuals in the "high capture" category state that whenever they have money on hand their family members are likely to request some of it, and that people who do well in business get requests from others for help. We do not obtain significant heterogeneity according to this variable for either men or women, with large standard errors and the point estimates varying quite a lot between the OLS and fixed effects specifications. Later in the paper we

examine alternative measures of capture to see whether this lack of significance is due to the particular choice of measure being used.

Finally we look at heterogeneity according to the initial size of the firm. Columns (5) and (6) consider this in terms of the initial capital stock of the firm, as firms were stratified as being above or below median baseline capital stock, while columns (7) and (8) define initial size in terms of initial profits. Since wave 2 profits were matched to form quadruplets, we first calculate the maximum wave 2 profit within a quadruplet or group, and then define firms as being in a low profits group if the maximum wave 2 profits for the group is less than 138 cedis (the median of profits over the whole sample). This classifies 62 percent of females and 45 percent of males as being in the low profits group. The results confirm the visual impression in Figures 1 and 2. In particular, we see that the cash grants have no significant impact for any size female firm, while the in-kind grants only have an impact for the 40 percent or so of firms with higher initial profits or higher initial capital stock. The impact of the in-kind grants is extremely large for these female firms – monthly profits increase by 77 to 96 cedis per month for the female firms in high initial profits quadruplets, compared to an insignificant 2 to 5 cedis per month for the low profits female firms. This difference is statistically significant. In contrast, there is no such pattern for male-owned firms – the point estimates for the lower profits firms are typically just as large as those for the higher profits firms, and the difference is not statistically significant.

Taking these results together, it appears that cash grants are not increasing profits for female-owned firms, and the in-kind grants only increase profits for female-owned firms which were larger in size to begin with. The in-kind treatments also increased profits for male-owned firms, and the effect of the cash grants is inconclusive for males. There does not appear to be the same heterogeneity by initial firm size in terms of male responsiveness to the grants.

4.3 Longer-term impacts

Table 5 uses the single longer-term follow-up survey to measure treatment impacts approximately three years post-treatment. We see for the pooled sample in column 1 that the in-kind treatment has approximately the same magnitude as the first year impact in Table 3, and is still statistically significant. We cannot reject equality of cash and in-kind treatments in this pooled sample. For males, both treatments have large, but not statistically significant, coefficients, and we cannot reject equality of treatment effects. However, we continue to see a significant flypaper effect for females, being driven by the high initial profit sample: the in-kind treatment appears to have

large and lasting impact on high initial profit women, but no impact on those with subsistence businesses, and no impact of cash on female businesses.

5 Interpretation of the results

5.1 Where do the grants go?

Table 6 uses the six main survey waves to examine the extent to which the grants are being used to increase the capital stock of the firm, to make transfers to non-household members, and for household spending. In panel A we show the results of estimating equation (2) with different outcomes, while in panel B we show the results of estimating equation (3) for the female sample and the categorization of low and high initial profits groups, since this is where we found large differences in treatment effects. For reasons of space we report the fixed effects estimates only (with the exception of transfers out which were not measured pre-treatment), since the OLS results are similar.

We begin by looking at the impact of the grants on the capital stock of the firms. Column (1) shows this for total capital stock. In order to reduce the influence of large outliers, column (2) truncates capital stock at the 99.5th percentile, which is 6130 cedis. Both specifications suggest that capital stock increases more for the in-kind treatments than for the cash treatments, both for men and women. However, the capital stock data is noisy and the standard errors are large, meaning we cannot reject equality of the effect of cash and in-kind grants on capital stock. Panel B shows stark differences between the women whose profits were initially low and those who had higher initial profits – there are large increases in capital stock for the high initial profits group, and no increase in capital stock for the low initial profits group that received the cash treatment. After truncating outliers, we can reject equality in treatment effects for the low and high initial profits groups for both cash and in-kind grants.

Figures 3 and 4 show the empirical CDFs of the post-treatment capital stock distribution by treatment group and gender for survey rounds 5 and 6. For males, Figure 3 shows a similar pattern to that of profits – namely that the distribution of the in-kind treatment group is shifted to the right compared to that of the control group across the distribution. The cash distribution is in between, although right at the top of the distribution crosses the control distribution curve several times, which explains the sensitivity of the cash treatment effect to where we truncate the data. For females, Figure 4 shows that both treatment groups overlap with the control group

for the bottom 60 percent of the distribution, a pattern similar to that seen for profits. The in-kind grant distribution then separates from the control above this, with women in the in-kind treatment group having higher 70, 80, and 90th percentiles of their capital stock distributions than the control group. The cash treatment group lies in between, and, unlike in the case of profits, does separate somewhat from the control group at the top of the distribution, suggesting some increases in capital for some firms as a result of the cash treatment.

Next we examine where the grants are going if not into the business. Beginning in wave 4, firm owners were asked "During the past three months, did you make any payments in cash or goods to people living outside your household?" and if so, asked the value of such transfers. Columns 3 and 4 show that women who received the cash grant were more likely to have made such a transfer, and to have given more. On average they are estimated to have given 8 cedis more a quarter over the last 3 quarters of the survey. This does not account for any transfers out made in the first quarter after treatment by firms treated after wave 2, since the wave 3 survey did not collect transfers data. However, restricting the analysis to the control group and firms treated after wave 3 only marginally increases the coefficient on the cash treatment, raising it to 8.9 cedis.

The remaining columns report the estimated impacts on household expenditure, which was collected each wave.[17] Point estimates suggest higher positive impacts on expenditure for those receiving the cash treatments than those getting the in-kind treatment or the control group, especially for women with low initial profits. We see a large and highly significant effect of the cash treatment on total quarterly spending for women as a whole, and for the subgroup of women with low initial profits.[18] The coefficients are huge: women who were given a 150 cedis cash grant are estimated to be spending 120 cedis more a quarter after the grant. The magnitude of this coefficient appears to be driven by a few firm owners reporting very large

[17] Unlike profits, panel consistency checks were not programmed for household expenditure items, and the data are quite noisy. In order to ensure extreme outliers are not driving the reported results, we report results using expenditures truncated at the 99.5th percentile. Results using the untruncated expenditures are qualitatively similar with larger standard errors, and slightly larger point estimates. The impacts on specific household expenditure categories are not well-identified due to this noise.

[18] Total quarterly spending is the sum of food, housing, fuel and light, non-durable household goods, communication, recreation, transport, household services, personal care, contributions to associations, clothing, ceremonies, household furnishing and appliances, vehicle, health and education expenses. The treatment effect for food, scaled up to the quarterly level, suggests half of the total expenditure increase comes through food, and the other half through these other assorted categories.

spending levels – truncating at the 99th percentile of total expenditure lowers this coefficient to 95, and at the 95th percentile lowers it to 76 cedis (which is still significant at the 5% level). For males receiving the cash treatment, the point estimates also suggest large increases in total quarterly spending (with a coefficient of 50 to 73 cedis depending on the level of truncation), but the standard error is so large that we can never reject equality with zero.[19]

Taken together, our results therefore offer an explanation at a basic level for the profits results. More of the in-kind grants ended up in the business than the cash grants. Women, especially those with lower initial profits, appear to have spent most, if not all, of the grants on household expenditure and transfers to non-household members. As a result, we see more impact of in-kind grants than cash grants on business profits.

5.2 How do the low and high initial profit women differ?

We have seen that the impact of the grants differs greatly between women with low initial profits and women with high initial profits. It is therefore worth examining in more detail the composition of these two subsamples. The first point to note is that these groups don't differ greatly in the industry or type of business, just in the scale. The low initial profit group is made up of 31 percent food sales, 18 percent beauty and hair, 9 percent sewing, and 42 percent trade, compared to 37 percent food sales, 9 percent beauty and hair, 6 percent sewing and 47 percent trade for the high initial profit group. Even when we look more finely within these broad sectors, we see a similar broad range of types of firms in both subgroups: kenkey and banku (both traditional prepared foods) sellers, dressmakers, beauty salons, used clothes sellers, and retail trade.

In contrast, the scale of the firms differs substantially. Table 7 compares the pre-treatment characteristics of these two subgroups of female firms to each other and to the male-owned firms. The final column also offers a comparison to the sample of female microenterprises from Sri Lanka used in de Mel et al (2009a). We see that mean and median monthly profits for the

[19] A further concern is that business owners may redirect the grants to other businesses that they or other household members run. Only 3.5 percent of women and 4.8 percent of men run more than one business at baseline. 30.0 percent of female business owners and 44.3 percent of male business owners live in a household where someone else also operates a business. When we ask cash grant recipients how they spent the grant, only 5.6 percent say they spent any of it on another household business. Moreover, the large positive average impact of the in-kind grant and negative and insignificant impact of the cash grant for women continues to hold when we restrict the sample to business owners who had no other household member operating a business at baseline.

low initial profits female subsample is 37-38 cedis, approximately US$1 per day, while mean and median profits are 4 to 6 times this level in the high profit group. Similarly, mean and median sales differs by a factor of 5 to 6 between the low and high initial profit groups. Mean capital stock for the low initial profits group is 251, versus 456 for the high profits group. Comparing to the other two groups, we see that the high initial profit females have larger profits than the average male-owned firms in the sample, while the low initial profits group are similar in size to the female-owned firms in the Sri Lankan study.

Table 7 also shows that women in the high initial profits group are more educated, have richer households (which may be a consequence of the higher profits rather than a cause), are more likely to keep accounts and to have had a formal loan, and have been in business slightly longer than the low initial profits firms. When it comes to the reasons for choosing a particular sector, women in the high profits group are more likely to say they chose their sector for earnings potential and less likely to say they chose it because it had a low capital requirement.

Overall this paints a picture of the low profits group as much smaller in size, with subsistence level income. For this group we see no impact of the grants on business profits. This is consistent with the finding in Sri Lanka, where the grants had no impact on female-owned businesses. The Sri Lankan businesses are similar in scale to the low initial profits female firms in Ghana – the 95th percentile of profits is only 70 GhC per month in the Sri Lankan sample, which is the 10th percentile of profits for the high initial profit group in Ghana. So for the types of female-owned businesses in Ghana that are similar in scale to those in Sri Lanka, we obtain similar results. Emran et al (2007) hypothesize that many of the women drawn into subsistence self-employment have very low efficient scale. If this is the case, then according to our models, neither cash nor in-kind grants should have any long-term impacts on business profitability for these types of low productivity firms. The difference is that the Ghanaian sample also includes a group of more successful female-owned businesses with larger scale, who do show increased profit growth from at least the in-kind treatment.

6 Why does a flypaper effect arise?

Our results show that cash and in-kind grants have very different impacts on the profitability of female-owned businesses, with this difference arising from the impacts on the initially more profitable women. As noted in our theory section, such a difference can only arise in the standard

Ramsey model (with or without time inconsistent preferences) if the in-kind treatment cannot be liquidated immediately and the firm has already reached its steady-state. But as we have discussed, it should have been possible for most firms to liquidate the in-kind grant within a month of treatment. This is not what the evidence shows: treatment effects persist for months if not years after treatment. Furthermore, if difficulties in liquidating excess inventories explain our results, we would expect a stronger flypaper effect for firms with a low initial capital stock and profits, for whom the in-kind grant represents a proportionally larger increase in capital. Instead we find the opposite for women. The impacts which we observe thus can not be due to a short-term overinvestment in capital.

A second possible explanation that might come to mind for the difference in cash and in-kind treatment effects is reporting bias. One may be concerned that the in-kind treatment recipients wanted to show they appreciated the gift by reporting better business outcomes, whereas the cash recipients did not because these gifts were not tied to the business. We think this explanation is unlikely for several reasons. First, our surveys were long and detailed, and we doubt that recipients would be able to coherently misreport across different business and household income and expenditure categories. Second, it is unclear why such a reporting effect should differ between high and low initial profit women. Third, if such an effect were to occur, we would expect it to be temporary, and the fact we still see evidence of a flypaper effect three years later makes it unlikely that selective reporting is the cause. Finally, our professional surveyers were trained to query if the amounts reported appeared unrealistic given what they observed of the firm, and they did not report large discrepancies of this nature arising.

Therefore models with a flypaper effect are needed to explain the results. Our theory gave three mechanisms which could give rise to this flypaper effect: heuristic mental accounting; a lack of self-control coupled with small frictions in liquidating the in-kind treatment; or external pressure coupled with these same frictions or with different sharing norms for using the in-kind treatment. In the latter two cases, the difference should only arise for firms below their steady-state capital level, since firms at their optimal size will want to divest the in-kind treatment.

We use digitspan recall as a measure of cognitive capacity, under the hypothesis that mental accounting heuristics might be more important for those with more limited cognition. We split the sample by above or below the median of 4 digits recalled. Our surveys contain multiple proxies for both the degree of self-control of the owner, and the degree of external pressure to share that they face. Since we did not pre-specify how we would use or combine these proxies,

and each is likely a noisy measure of the underlying concept of interest, our preferred approach is to use a principal component to extract the common signal from these variables. Nevertheless, we acknowledge that this section of the paper should be considered more exploratory in nature.

We have four proxies for self-control and the ability to save cash, all of which were measured prior to treatment. These are: whether the respondent used a susu collector; whether they agree with the statement "I save regularly"; whether they are above or below the median discount rate when asked a standard hypothetical discounting question about the amount today that would leave them indifferent between that and 100 cedis one month from now; and a standard measure of hyperbolicity, based on whether their preferences switch to be more patient when asked to choose between amounts at 5 and 6 months. Appendix Table 4 shows the principal component weights on each variable, with this component loading most strongly on the discount rate and hyperbolicity variables.[20] We call the resulting index our "lack of self-control" measure.[21]

Our surveys also contain a number of proxies for external pressure to share. We begin with four self-assessed measures: whether the firm owner says they feel a lot or some pressure to share extra business income with other household members rather than invest in the business; whether they agree that whenever they have money on hand, their spouse or other family members always end up requesting some; whether they agree that people who do well in their business are likely to receive additional requests from family and friends to help out; and whether they agree that machines and equipment held in their business are a good way of saving money so others don't take it. We call the first principal component of these variables our "narrow external pressure" index, which loads most strongly on the second and third variables listed here – which are those which were used to construct the "high capture" measure we stratified the randomization on.

We also consider a broader measure of external pressure which additionally adds whether or not the individual is married, their household size, and the number of siblings in Accra/Tema in forming the principal component. The presumption is that, all else equal, people who are married, who have larger households, and who have more siblings in the area will have more demands to share. However, they may also confer advantages on the business owner such as larger networks, more support for the business, or other people to deflect requests for help to.

[20] As a result, the results are similar, although not as precise, when we just use the discount rate and hyperbolicity variables in constructing the principal component.

[21] Appendix Table 5 presents the treatment interactions when treatments are interacted one at a time with each individual proxy variable used in forming these principal components. The results are less precise given the lower signal in binary variables, but overall give a similar picture to the indices.

We denote this index "broad external pressure".[22]

We then re-estimate our treatment model, allowing for heterogeneity in the treatment effects by these measures of internal and external pressure. One may worry about the extent to which the variables are truly capturing the underlying theoretical concepts. For example, people may use a susu collector to keep money away from others (as in Anderson and Baland, 2002), or to overcome their own self-control issues. Likewise, people who know that others will exert pressure on them to share if they have cash on hand may respond by exhibiting high discount rates. The use of principal components helps overcome this concern to some extent, by drawing out the common signal in interrelated variables. The indices are not very highly correlated: the lack of self-control index has a correlation of 0.043 with the narrow external pressure index and 0.065 with the broader index. Empirically the lack of self-control index therefore appears to be capturing a different concept than the external pressure index is.

Table 8 presents the results. First, pooling men and women, in column 1 we see no significant interaction effect with digitspan recall, suggesting a simple heuristic mental accounting explanation is not the reason for the flypaper effect. Columns 2 and 3 then consider our self-control and external pressure indices. We see that there is a strong negative and significant interaction between lacking self-control and receiving the cash treatment. Since the lack of self-control index varies from -1.68 to +2.26, someone with the most self-control has a cash treatment effect in column 2 which is approximately the same as their in-kind treatment effect. In contrast, the interaction of cash with either the narrow or broad measure of external pressure is positive (the opposite of what we would predict if pressure to share is the reason for lack of growth from cash) and insignificant.

The remaining columns of table 8 then split the sample into the initially high profit women, the initially low profit women, and men. For initially high profit women, we see a strong and significant interaction between the cash treatment and a lack of self-control. The point estimate is large enough to explain away the gap in impact between the cash and in-kind treatment for those women with high levels of self-control. In contrast, there is a small and insignificant interaction of the cash treatment with the narrow measure of external pressure, and the interaction is actually positive and weakly significant for the broader measure of external pressure. This appears to

[22] We also tried additional measures of external pressure measured in terms of proxies for bargaining power differences among married couples (such as age and education differences, share of assets brought to marriage, and whether they could spend money without the spouse's consent). These variables are only available for the subset of married individuals, and did not explain the difference between cash and in-kind treatments.

be coming from the household size and sibling components, and is consistent with Grimm et al (2010) who find a positive impact of nearby networks on firm growth. In contrast, for initially low profit women, we see no significant interactions with either self-control or external pressure measures, which is consistent with them already being at their technically efficient firm size, and having no scope to grow. Finally, for men we get a relatively large negative point estimate on the interaction of lack of self-control with cash that is similar in scale to that for women, but less precise and statistically insignificant.

Our power for this exploratory analysis is low, which coupled with noise in measuring these concepts means we typically cannot reject equality of the interaction effects between the cash and in-kind treatments. Nevertheless, the point estimates and significance of the interaction of our self-control measure with the cash interaction do suggest that self-control rather than external pressure is the main driver of the flypaper effect in this setting.[23] Subsistence women already seem to be at their (low) technically efficient frontier, so regardless of the form of capital, they get the capital out of the business and spend it on non-business items. Women who initially had higher profits have more scope to grow their business, and appear to have capital below their efficient level. If capital is forced into the business through in-kind grants, this appears to be sufficiently sticky to overcome any self-control issues and leads to an increase in profits. In contrast, only high initial profit women with strong levels of self-control end up investing and keeping cash grants in the business and experiencing the same growth. Males also seem to have scope for growth regardless of their size, but we can neither reject that they benefit equally from the cash and in-kind grants nor that they are subject to the same heterogeneity with respect to self-control as the high-profit women are.

7 Conclusions

We find evidence of a flypaper effect among Ghanaian microenterprises. This finding is difficult to reconcile with models of accumulation that take either a standard Ramsey form or incorpo-

[23] Another mechanism that could, at least potentially, account for the difference between in-kind and cash transfers is that asking subjects to choose a specific input for their business causes an "implementation intention" that is sufficient to induce entrepreneurs to invest more in their business. See Nickerson and Rogers (2010) for an example of such effect on voting. Testing this hypothesis directly would require another experiment. This explanation, however, could not easily account for the various patterns present in the data – we would need implementation intention to be correlated with self-control, and to only apply for high initial profit but not low initial profit women.

rate a present bias but maintain the assumption of asset integration. These results suggest a lack of asset integration, as if entrepreneurs fail to take consumption and investment decisions jointly. The difference between in-kind and cash grants is suggestive either that inventories and equipment serve as a self-commitment device against impulse purchases – or that entrepreneurs evade a social solidarity tax, by household members and relatives, on the cash flow of the firm but not its equipment and inventories.

The evidence of a flypaper effect is most significant for certain female entrepreneurs in Ghana. In-kind grants lead to large increases in business profits, but only for female-owned firms which were initially more profitable – subsistence firms don't grow when given more capital. In-kind grants also lead to large increases in business profits for men, while the effect of cash grants is less robust – we find large positive and significant effects when we don't condition on baseline profits, but smaller and insignificant effects when we do. The difference between cash and in-kind treatments is strongest among successful female entrepreneurs, that is, those with high pre-treatment profits.

We seek to identify the reason for the flypaper effect, i.e., whether it originates in self-control difficulties or in pressure from household and family members. Our results suggest that the main mechanism is through self-control issues. Individuals with below steady state capital stock who receive the in-kind treatment appear to be able to use the frictions involved in liquidating the capital as a way to overcome these issues of self-control and grow their businesses. However, our measures of self-control is an index that was not pre-specified, and so it would be beneficial in future work to better measure both internal and external pressure and specify these measures ex ante.

Finally, our results both help generalize the finding from work in Sri Lanka that the returns to capital for women running subsistence businesses are low on average, as well as giving new evidence of the value of capital for a group not present in the Sri Lankan study - women with higher initial profitability. We do find in Ghana a relatively large group of women whose profits increase a lot when given in-kind transfers. Microcredit has been argued as allowing individuals to overcome present-bias by providing self-discipline and encouragement through regular payments and group meetings (Bauer et al, 2012). If this is true, the effectiveness of micro loans in improving business outcomes is likely to resemble the effect of in-kind grants in our experiment. However, our findings suggest this effect to be more powerful for women who are already earning more to begin with, suggesting possible limits on the ability of capital alone to

generate business growth among poor subsistence-level female enterprises. Moreover, as in prior work in Sri Lanka and Mexico, the results show that the average male-owned microenterprise gains a lot from being granted additional access to capital. This suggests that microfinance programs that focus primarily on women may be ignoring a large group of enterprises with a need for more capital.

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Appendix 1: Theoretical response to treatment with asset integration

7.1 The Ramsey model

Consider an entrepreneur facing a standard accumulation problem of the form:

$$\max_{c_t>0,k_t\geq 0,w_t\geq 0} \sum_{t=0}^{\infty} \delta^t u(c_t) \text{ subject to}$$

$$c_t = \pi(k_t,\theta) + rw_t - (k_{t+1}-k_t) - (w_{t+1}-w_t) \tag{8}$$

where k is capital invested in a business with total return to capital $\pi(k,\theta)$, variable θ is individual specific talent, δ is the discount factor, and w is a financial asset with return r.[24] We assume $\partial\pi/\partial k \geq 0$ (positive or zero returns to capital) but $\partial^2\pi/\partial k^2 < 0$ (decreasing returns to scale). Decreasing returns to scale may be due to the presence of fixed factors, such as entrepreneur time and family labor. We also assume that $\partial^2\pi/\partial k\partial\theta > 0$: more talented entrepreneurs have higher marginal returns to capital.[25]

There are two possible treatments: a cash transfer M_t and an in-kind transfer E_t at an arbitrary time t. Both can be turned into more capital k but it takes time to liquidate grant E_t that comes in the form of equipment or inventories. In contrast, M_t is liquid and perfectly fungible with k or w or c. We derive model predictions about $\partial k/\partial M$ and $\partial k/\partial E$.

We first note that, by asset arbitrage, $w_t = 0$ if $\pi'_t(k,\theta) > r$. In this case, the first order conditions are as follows:

$$\beta^t u'_t = \lambda_t$$

$$\lambda_t(1+\pi'_t) = \lambda_{t-1}$$

where π' denotes the marginal return to capital and λ_t is the Lagrange multiplier associated with the constraint. From the above we get a standard Euler equation of the form:

$$1 + \pi'_t(k,\theta) = \frac{1}{\delta}\cdot\frac{u'_{t-1}}{u'_t}$$

[24] Variable $\pi(k,\theta)$ measures value added, that is, return to capital and family labor net of intermediate input costs and other recurrent costs. Given the nature of the studied firms, this corresponds to an accounting notion of profit, but not to an economic notion of profit/return to capital since we have not imputed the cost of the entrepreneur's labor.

[25] It is conceivable that a minimum level of capital is needed to initiate a business. Since all households in our sample by construction have a business, we ignore this here.

If we ignore savings w_t, there exists a steady state level of capital k^* such that profit π and consumption c are constant and:

$$\pi'(k^*, \theta) = \rho$$

where $\rho \equiv \frac{1-\delta}{\delta}$. The proof follows from the fact that, without savings w_t, the above is a standard Ramsey model. Given that $\partial^2\pi/\partial k^2 < 0$ it follows that $dk^*/d\rho > 0$ – more patient entrepreneurs have larger k^*.

If $r > \rho$, the entrepreneur stops investing in the firm once the marginal return to capital falls below r, and invests in w instead. The optimal firm size is then given by:

$$\pi'(k^{**}, \theta) = r$$

with $k^{**} < k^*$. Given our assumption that, $\partial^2\pi/\partial k\partial\theta > 0$ comparative statics imply that both $dk^*/d\theta > 0$ and $dk^{**}/d\theta > 0$ – more talented entrepreneurs have larger steady state capital and firm size. Only patient agents — that is, those with $\rho < r$ — ever hold non-zero savings, $w_t > 0$.

If $k_t < \min\{k^*, k^{**}\}$, the cash and in-kind treatments are predicted to increase capital and profits by the same amount.[26] Their long term effect is to shorten the time necessary to reach the steady state firm size. In contrast, when a entrepreneur has reached k^* or k^{**}, the effect of the two treatments is different. If $k = k^{**}$, a cash transfer has no effect on capital and $\partial k_{t+s}/\partial M_t = 0$ for any $s \geq 0$; it raises consumption c and savings w instead. In this case we should observe no cash treatment effect on profits $\pi_{t+s}(k, \theta)$: the cash treatment M_t should not be invested in firms that have already reached their optimal size; it should be saved instead. If the in-kind treatment E_t cannot be liquidated immediately, however, we expect a temporary positive effect on profit: $\pi(k + E, \theta) > \pi(k, \theta)$ since, by assumption, $\partial\pi/\partial k \geq 0$. But this effect should be short-lived: the firm should return to its steady state capital level as soon as E can be divested. If $k = k^*$ with $\rho > r$, then instead of saving in asset w in order to smooth consumption of the capital grant, it is optimal for the entrepreneur to use a temporary investment in the firm as buffer to smooth consumption. In this case, M_t and E_t have a similar short-run effect on capital and profits.

In all cases the model predicts that the cash and in-kind treatments will result in higher consumption. In the steady state case with $\rho > r$, the household is impatient and the treatment will be consumed rapidly before consumption returns to its steady state level. In the case where

[26] In the interest of space, we do not discuss the case where $k_t + M > \min\{k^*, k^{**}\} > k_t$. This case is effectively a weighted average of the two cases we describe.

$r > \rho$, there will be more smoothing, that is, part of the treatment will be saved and consumed later. In the case where k_t is below its steady state, we expect an increase in consumption out of higher profits.

7.2 Time-inconsistent preferences

We now introduce quasi-hyperbolic preferences as in Laibson (1997). At time t the household sets k_t so as to solve:

$$\max_{\{c_s, w_s, k_s\}} u(c_t) + \beta \sum_{s=t+1}^{\infty} \delta^s u(c_s) \text{ subject to (8)} \tag{9}$$

where $\beta < 1$. But once at time $t+1$, the household sets k_{t+1} according to:

$$\max_{\{c_{s+1}, w_{s+1}, k_{s+1}\}} u(c_{t+1}) + \beta \sum_{s=t+2}^{\infty} \delta^s u(c_s) \text{ subject to (8).} \tag{10}$$

This means that at time $t+1$ the household wants to revisit decisions taken at time t and set paths for $\{c_{t+1}, c_{t+2}, ...w_{t+1}, w_{t+2}, ..., k_{t+1}, k_{t+2}, ...\}$ that differ from those set in period t.

We now show that the entrepreneur stops investing after reaching a steady state level of capital k^s (for a sophisticate) or k^m (for a myopic decision maker) which are, in general, smaller than k^*. Let τ denote the one period-ahead discount rate:[27]

$$\frac{1}{1+\tau} \equiv \beta\delta.$$

Let k^s be the level of capital that satisfies:

$$\pi'(k^s, \theta) = \tau.$$

Is k^s the steady state capital of a time inconsistent entrepreneur? It depends on whether the decision maker is sophisticate or myopic, that is, whether he or she realizes that future decisions were taken according to (10) or not.

Suppose the decision maker is sophisticate and sets $k_t = k^s$. Is this a steady state? The Euler equation between t and $t+1$ is:

$$1 + \pi'(k_{t+1}, \theta) = \frac{1}{\beta\delta} \cdot \frac{u_t'(c_t)}{u_{t+1}'(c_{t+1}^P)} \tag{11}$$

where c_{t+1}^P denotes the household's predicted future decision about c_{t+1}. If the household is myopic, c_{t+1}^P is expected to coincide with the decision made at time t, i.e., as given by (9). If

[27] It is clear that $\tau > \rho$. If, as is likely, $\tau > r$, the household will never want to set $w > 0$. So we ignore savings here.

the household is sophisticate, it is the correctly anticipated decision taken at time $t+1$ as given by the solution to (10).

First note that if $c^P_{t+1} = c_t$, then $u'_t(c_t) = u'_{t+1}(c^P_{t+1})$ and setting $k_t = k^s$ satisfies the above Euler equation. If the entrepreneur is sophisticate and sets $k_t = k^s$, she realizes that the decision problem and Euler equation at $t+1$ will be identical to those at t. Hence she correctly anticipates that $c^P_{t+1} = c_t$. It follows that k^s is the steady state level of firm capital for a sophisticate entrepreneur.

If the entrepreneur is myopic and sets $k_t = k^s$, she incorrectly believes that she will be more patient next period. Let c^M_{t+1} denote the consumption level she sets for $t+1$, not realizing that at $t+1$ she will want to increase consumption beyond c^M_{t+1}. At $k_t = k^s$ the entrepreneur expects $c^M_{t+1} < c_t$, which implies that $u'_{t+1}(c^P_{t+1}) > u'_t(c_t)$. Hence k^s does not satisfy the Euler equation (11) and is not a steady state. For a myopic decision maker, the steady state capital k^m is such that $c_t = c_{t+1}$ and $c^M_{t+1} = c^M_{t+2}$. Since $c^M_{t+1} < c_{t+1}$, it follows that $\frac{u'_t(c_t)}{u'_{t+1}(c^M_{t+1})} < 1$, which in turn implies that $k^s < k^m$ and

$$\pi'(k^m, \theta) > \tau.$$

It follows that model predictions regarding the effect of a capital grant are similar to the Ramsey model. If the firm has already reached its steady state k^s or k^m, the cash transfer M will be rapidly consumed while the in-kind grant E will be divested as quickly as is feasible. If $k_t < k^s$ or k^m, then the additional cash M or inventories E will remain in the business and increase future profits.

Appendix 2: Robustness to Attrition

Attrition in the panel comes from firms closing, refusing to answer the survey, or answering the survey but not providing profits data. Appendix Table A1 provides attrition rates per round for the experimental sample. Recall that we eliminated firms which closed or refused to answer the round 2 survey before undertaking the randomization. As a result, attrition from the survey is zero by definition for the experimental group in rounds 1 and 2, although there is some item non-response on profits. Over the course of our experiment we observe 6 percent of the firms closing, with this rate not varying between treatment and control. We were able to keep attrition fairly low over waves 3 through 6 of the survey, and exerted additional effort in round 6 to track and obtain responses from firms that had attrited in previous waves. As a result, only 8 percent of the sample is not present in wave 6. In total, 11 percent of the firms do not report profits data. Overall attrition rates are higher for the control group than either

treatment group. One possibility is that those receiving the grant felt an implicit obligation to continue in the survey, or alternatively that those who weren't randomly selected for the grants felt discouraged. To investigate this possibility, we tested whether untreated firms were more likely to refuse to answer enumerators. We find no evidence of this. We do, however, find some evidence that (male operated) firms that received the in-kind treatment are less likely to exit, change location, or change business.[28] This suggest that, if anything, attrition leads to an underestimate of the effect of treatment on profits. Whilst statistically significant, the difference in attrition magnitudes are not that large, which should limit the impact of this differential attrition on our results.

To examine how robust our results are to attrition, we use the bounding approach of Lee (2009) to construct upper and lower bounds for the treatment effect. The key identifying assumption for implementing these bounds is a monotonicity assumption that treatment assignment affects sample selection only in one direction. In our context, this requires assuming that there are some firms who would have attrited if they had not been assigned to treatment, but that no firm attrits because of getting assigned to treatment. This seems plausible in our context. We then construct the bounds by trimming either the top or the bottom of the distribution of profits for the treatment groups by the relative difference in attrition rates between treatment and control. This is done on a wave by wave basis, and involves trimming up to 6 percent from the top or bottom of the distribution of the treatment group.

Table A2 shows the results of estimating these Lee bounds. Columns 1 and 2 repeat the main trimmed estimates from Table 3 for comparison. These lie between the bounds estimated in columns 3 and 4 using OLS, and in columns 5 and 6 using fixed effects. We see that our parameter estimates are much closer to the upper bounds than the lower bounds, which reflects the skewed distribution of profits.

The lower bounds occur only if it is the most profitable control firms that attrit. However, a panel regression predicting attrition in the control group (in the form of missing profits) as a function of the previous period's profits finds that having the previous period's profits in the top 10 percent or in the bottom 10 percent, or below the median has no significant effect on attrition. Similarly, firms which experience large changes in profits over two waves are no more

[28] This is obtained by regressing dummy variables for answering, exiting, changing location, and changing business, on treatment (differentiated by type and gender), wave fixed effects, and individual fixed effects. Results are not shown here to save space.

likely to attrit in the subsequent wave. As a result, it seems attrition in the control group is not associated with previous levels or previous changes in profits. Given this, it seems reasonable to assume that profits are either missing at random, or missing in firms which suffer negative shocks that cause the firm to shut down or the owner to be sick in the survey period. That is, there seems reason to believe either the panel estimates in columns (1) or (2), or the upper bound estimates which are based on the least successful control firms attriting. There seems to be no evidence to support the most successful control firms attriting, which is what the lower bound estimates assume. We therefore conclude the main results do not seem to be driven by attrition.

Appendix 3: Is it reasonable to pool effects over time?

To test for pooling of treatment effects we allow the coefficients on treatment in equation (1) to vary with time since treatment. In doing this, one should note that we only observe effects 12 months after treatment for the firms treated after round 2, which is half of the treated sample. In contrast, we observe effects at 3 months and 6 months for the entire treated sample, and effects at 9 months for almost all the sample (excepting the 18 firms treated after round 4). Appendix Table A3 then shows the results. We cannot reject that the impact of treatment does not vary with time since treatment for the pooled sample, and for the male sample, or for the female sample using OLS. For the female sample using fixed effects, the p-value for equality of in-kind treatment effects over time is 0.057, offering some suggestion that the impact is greater with more time since treatment.

Table 1: Timeline

Date	*Surveys*	*Treatments*
Oct-Nov 2008	Survey round 1	
Feb 2009	Survey round 2	
March 2009		198 firms treated
May 2009	Survey round 3	
June 2009		181 firms treated
August 2009	Survey round 4	
September 2009		18 firms treated
November 2009	Survey round 5	
February 2010	Survey round 6	
March 2012	Long-term follow-up	

Table 2: Characteristics of Microenterprises and Verification of Randomization

	Full Sample					Trimmed Sample				
		Control	Cash	In-kind			Control	Cash	In-kind	
	N	Mean	Mean	Mean	p-value	N	Mean	Mean	Mean	p-value
Variables Using to Stratify or Match										
Monthly profits in January 2009	781	128	132	131	0.985	753	103	99	115	0.494
Female	793	0.60	0.60	0.61	0.994	765	0.62	0.62	0.62	0.994
High Capture	793	0.58	0.58	0.57	0.951	765	0.58	0.58	0.57	0.964
High Baseline Capital Stock	793	0.49	0.49	0.49	0.994	765	0.48	0.48	0.48	0.999
Male in Male dominated industry	793	0.18	0.19	0.18	0.992	765	0.18	0.18	0.18	0.991
Male in Mixed industry	793	0.21	0.21	0.21	1.000	765	0.20	0.20	0.20	1.000
Female in Female dominated industry	793	0.29	0.29	0.29	0.992	765	0.30	0.29	0.30	0.992
Female in Mixed industry	793	0.31	0.31	0.31	1.000	765	0.32	0.32	0.32	1.000
Other Variables										
Monthly profits in October/November 2008	729	124	133	104	0.175	704	93	129	99	0.019
Monthly sales in January 2009	790	724	463	630	0.133	762	412	402	595	0.047
Number of hours worked in last week	785	58.82	60.55	57.13	0.351	757	59.03	60.64	56.64	0.253
Total Capital Stock in January 2009	784	468	454	418	0.771	757	446	438	410	0.871
Inventories at end of January 2009	791	258	213	201	0.580	763	239	203	198	0.755
Uses a Susu Collector	791	0.49	0.46	0.49	0.701	763	0.49	0.46	0.51	0.650
Business operated out of home	793	0.76	0.78	0.82	0.283	765	0.77	0.78	0.83	0.248
Age of Firm	788	7.87	7.13	7.22	0.429	761	7.88	7.11	7.14	0.381
Ever had bank or microfinance loan	793	0.11	0.10	0.07	0.335	765	0.10	0.09	0.07	0.444
Business has a tax number	786	0.15	0.14	0.13	0.858	758	0.14	0.14	0.13	0.974
Owner is Married	791	0.65	0.64	0.67	0.791	763	0.65	0.63	0.68	0.662
Owner's Years of Education	775	8.87	8.75	9.05	0.687	749	8.81	8.70	9.00	0.695
Owner's Digitspan Recall	768	5.11	5.07	5.03	0.909	740	5.07	5.10	4.99	0.877
Owner is Akan Speaker	793	0.45	0.41	0.43	0.654	765	0.46	0.41	0.43	0.604
Owner is Ga/Dangme Speaker	793	0.28	0.27	0.31	0.667	765	0.29	0.27	0.32	0.586
Owner's Age	791	36.39	35.43	35.74	0.429	763	36.36	35.37	35.79	0.451

Note: Trimmed Sample eliminates 7 matched groups (28 firms) in which baseline profits for at least one firm in group exceed 1500 cedis per month; p-value is for an F-test of equality of means across the three groups; N denotes sample size.

High Capture refers to firms having above median responses to questions on two questions about whether their spouse and family members end up requesting money whenever they have additional money or succeed in business (see text for exact questions).

Table 3: Main Treatment Effects

Dependent Variable: Real Monthly Profits (Cedi)

	(1) OLS	(2) OLS	(3) FE	(4) FE	(5) OLS	(6) OLS	(7) FE	(8) FE	(9) OLS	(10) OLS
Cash Treatment	14.50*	9.59	3.96	0.48						
	(8.68)	(7.32)	(13.89)	(8.23)						
In-kind Treatment	38.60***	36.75***	43.23***	30.87***						
	(11.21)	(10.67)	(12.31)	(10.73)						
Cash Treatment*Female					5.21	5.17	1.22	-2.30	5.74	5.59
					(8.47)	(8.54)	(9.35)	(8.77)	(11.57)	(11.62)
In-kind Treatment*Female					35.75**	37.65**	35.61***	32.87**	47.35**	49.92**
					(14.94)	(14.94)	(13.56)	(13.21)	(21.35)	(21.44)
Cash Treatment*Male					28.99	16.81	8.74	5.13	44.79**	34.17**
					(17.68)	(13.25)	(31.58)	(16.10)	(19.42)	(15.51)
In-kind Treatment*Male					43.38**	35.45**	55.15**	27.83	60.33***	50.61***
					(16.80)	(14.04)	(23.06)	(18.15)	(19.76)	(17.66)
Constant	119.69***	102.19***	120.34***	103.05***	119.70***	102.20***	120.37***	103.05***	99.47***	94.92***
	(8.84)	(4.40)	(7.37)	(3.71)	(8.85)	(4.39)	(7.38)	(3.70)	(5.95)	(5.50)
Baseline trimming	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Waves	All	All	All	All	All	All	All	All	5 and 6	5 and 6
Observations	4354	4203	4354	4203	4354	4203	4354	4203	1392	1344
Number of firms	792	764	792	764	792	764	792	764	736	710
P-values for testing:										
Cash = In-kind	0.067	0.031	0.013	0.016						
Cash = In-kind for Females					0.073	0.057	0.021	0.019	0.074	0.058
Cash = In-kind for Males					0.487	0.300	0.149	0.305	0.516	0.421
Cash Male = Cash Female					0.225	0.460	0.820	0.685	0.085	0.141
In-kind Male = In-kind Female					0.735	0.915	0.465	0.822	0.656	0.980

Notes:

All estimation includes wave effects, which vary by gender in columns 5 on. Standard errors in parentheses, clustered at the firm level.

Trimmed specifications trim out 7 matched quadruplets which have at least one firm with profits above 1500 cedis per month in wave 1 or 2

Randomization occurred within matched quadruplets. OLS estimation includes dummies for these strata.

*, ** and *** denote significant at the 10%, 5% and 1% levels.

Table 4: Treatment Heterogeneity by Randomization Strata

Dependent Variable: Real Monthly Profits (Cedi)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Interaction Category A	Single-Sex Industry		Low Capture		Low Capital		Low Profits	
Interaction Category B	Mixed Industry		High Capture		High Capital		High Profits	
Panel A: Females								
Cash Treatment*Category A	9.62	-6.87	2.12	-8.53	3.13	-11.25	3.29	-8.58
	(10.08)	(10.57)	(12.40)	(13.55)	(10.62)	(11.75)	(7.15)	(9.65)
Cash Treatment*Category B	1.44	1.78	7.89	4.49	8.29	8.98	6.83	6.81
	(13.37)	(13.47)	(12.00)	(11.35)	(14.05)	(13.06)	(20.59)	(17.01)
In-kind Treatment*Category A	26.37*	25.39	28.30	35.41	15.96	14.25	2.21	4.58
	(14.31)	(17.03)	(23.00)	(24.07)	(10.77)	(10.41)	(6.97)	(7.52)
In-kind Treatment*Category B	48.26*	39.77**	46.66***	31.06**	65.06**	55.67**	96.18***	76.53**
	(25.60)	(19.94)	(14.15)	(12.50)	(30.21)	(26.19)	(36.95)	(30.69)
Number of Observations	2604	2604	2604	2604	2604	2604	2604	2604
Number of Firms	474	474	474	474	474	474	474	474
P-values for testing:								
Cash Treatments equal	0.625	0.614	0.740	0.462	0.771	0.250	0.871	0.432
In-kind Treatments equal	0.456	0.584	0.457	0.873	0.124	0.142	0.013	0.023
Cash=In-kind	0.156	0.058	0.056	0.061	0.155	0.051	0.119	0.056
Panel B: Males								
Cash Treatment*Category A	-2.82	-5.75	-0.06	10.72	0.68	-0.72	17.23	-1.50
	(16.42)	(21.54)	(19.55)	(23.92)	(18.06)	(20.14)	(12.99)	(12.76)
Cash Treatment*Category B	36.60*	17.00	25.13	0.77	30.16	8.66	15.43	9.50
	(20.25)	(23.63)	(17.36)	(21.00)	(18.83)	(24.00)	(22.96)	(27.99)
In-kind Treatment*Category A	44.85**	23.47	43.56	58.33	46.55**	26.33	35.08*	32.20
	(21.72)	(31.46)	(27.06)	(35.74)	(19.24)	(25.52)	(18.00)	(23.07)
In-kind Treatment*Category B	28.55	33.69	30.49*	8.94	25.78	28.51	34.88	21.99
	(18.54)	(20.66)	(15.76)	(19.42)	(20.31)	(25.59)	(21.57)	(27.48)
Observations	1599	1599	1599	1599	1599	1599	1599	1599
Number of Firms	290	290	290	290	290	290	290	290
P-values for testing:								
Cash Treatments equal	0.132	0.477	0.337	0.755	0.260	0.765	0.946	0.721
In-kind Treatments equal	0.569	0.786	0.677	0.226	0.458	0.952	0.994	0.776
Cash=In-kind	0.151	0.596	0.312	0.349	0.171	0.509	0.563	0.417

Notes:

All estimation includes wave effects which vary by category. Standard errors in parentheses, clustered at the firm level.

Sample trims out 7 matched quadruplets which have at least one firm with profits above 1500 cedis per month in wave 1 or 2

Randomization occurred within matched quadruplets. OLS estimation includes dummies for these strata.

*, ** and *** denote significant at the 10%, 5% and 1% levels.

Table 5: Impact Three Years Post-Treatment

Dependent Variable: Real Monthly Profits (Cedi)

	All Firms	Males	Females	High Initial Profit Women	Low Initial Profit Women
	(1)	(2)	(3)	(4)	(5)
Cash Treatment	22.56	78.50	-14.60	-30.56	-4.682
	(26.38)	(56.16)	(22.70)	(48.40)	(19.29)
In-kind Treatment	43.51*	58.04	36.32	109.9**	-7.535
	(26.16)	(54.20)	(22.97)	(49.93)	(19.29)
Test that Cash=In-Kind p-value	0.478	0.734	0.053	0.015	0.897
Observations	544	211	333	128	205

Notes:

Standard errors in parentheses, clustered at the firm level. *, ** and *** denote significant at the 10%, 5% and 1% levels respectively.

Randomization occurred within matched quadruplets. OLS estimation includes dummies for these strata.

Table 6: Where do the grants go?

	Capital Stock FE	Truncated Capital Stock FE	Made a Transfer Out OLS	Amount Transferred Out OLS	Weekly Food Spending FE	Quarterly Clothing Spending FE	Quarterly Health & Education Spending FE	Quarterly Ceremonies Spending FE	Total Annual Spending FE	Log Annual Spending FE
Panel A: Males and Females										
Cash Treatment*Female	82.61	49.17	0.05*	8.05**	3.81	3.38	-1.05	1.39	120.54***	0.08*
	(72.01)	(37.27)	(0.03)	(3.46)	(2.44)	(3.90)	(13.42)	(3.17)	(45.61)	(0.04)
In-kind Treatment*Female	135.34**	120.24***	0.02	1.76	-0.07	-0.50	-6.08	2.33	45.36	-0.02
	(65.55)	(34.51)	(0.03)	(2.92)	(2.60)	(4.39)	(13.03)	(3.46)	(44.36)	(0.04)
Cash Treatment*Male	31.36	2.21	0.03	-4.06	3.93	9.52*	0.98	3.27	63.94	0.03
	(70.33)	(61.10)	(0.04)	(3.93)	(3.12)	(5.08)	(11.26)	(3.92)	(50.82)	(0.04)
In-kind Treatment*Male	157.71	83.74	0.01	-6.01	-2.82	3.63	-0.85	4.36	20.95	-0.01
	(102.12)	(69.85)	(0.04)	(3.95)	(3.42)	(5.83)	(23.28)	(5.20)	(65.12)	(0.05)
Number of Observations	4256	4256	2033	2203	4268	3911	3713	4286	4495	4299
Number of Firms	765	765	722	722	765	761	753	765	765	765
P-values testing:										
Cash = In-kind Females	0.573	0.107	0.294	0.137	0.198	0.478	0.776	0.817	0.172	0.054
Cash = In-kind Males	0.212	0.291	0.693	0.630	0.111	0.428	0.942	0.856	0.573	0.611
Panel B: Female Sub-sample										
Cash Treatment*Low Profits	-6.77	-6.78	0.07**	6.13**	7.26**	4.66	15.39	2.94	197.84***	0.16**
	(29.67)	(29.69)	(0.03)	(2.80)	(3.32)	(4.24)	(18.93)	(4.11)	(58.16)	(0.06)
Cash Treatment*High Profits	238.00	145.84*	0.02	11.54	-2.13	8.29	-25.71	-8.05	-53.38	-0.07
	(185.23)	(85.70)	(0.04)	(8.35)	(4.27)	(8.08)	(18.79)	(5.48)	(81.92)	(0.06)
In-kind Treatment*Low Profits	59.17**	59.17**	0.01	-0.40	1.11	4.10	3.83	-2.38	32.92	-0.02
	(28.45)	(28.46)	(0.03)	(2.02)	(3.93)	(5.20)	(18.81)	(3.09)	(63.98)	(0.06)
In-kind Treatment*High Profits	262.60	223.24***	0.03	5.12	-1.99	-2.43	-18.48	3.11	18.07	-0.04
	(166.25)	(77.66)	(0.05)	(6.76)	(3.94)	(8.01)	(17.24)	(7.79)	(68.53)	(0.06)
Number of Observations	2654	2654	1260	1260	2657	2440	2323	2666	2790	2670
Number of Firms	475	475	446	446	475	475	468	475	475	475
P-values testing:										
Cash Treatments Equal	0.193	0.093	0.351	0.540	0.083	0.691	0.124	0.109	0.013	0.007
In-kind Treatments Equal	0.228	0.048	0.769	0.435	0.578	0.494	0.382	0.513	0.874	0.827

Notes:

Sample used excludes 7 matched quadruplets (28 firms) which have at least one firm with profits above 1500 cedis per month in wave 1 or 2

Randomization occurred within matched quadruplets. OLS estimation includes dummies for these strata.

All expenditure data are truncated at the 99.5th percentile of the follow-up data.

All estimation includes wave effects which vary by gender, and by category in panel B. Standard errors in parentheses, clustered at the firm level.

High and Low profits refers to groups defined on pre-treatment profits.

*, ** and *** denote significant at the 10%, 5% and 1% levels.

Table 7: Comparison of Characteristics of High and Low Profit Women

	Men	Low Initial Profit Women	High Initial Profits Women	Sri Lankan Women
Monthly profits in January 2009[a]				
Mean	130	38	173***	28
Median	91	37	137***	20
Monthly sales in January 2009				
Mean	502	187	822***	87
Median	240	120	500***	50
Total Capital Stock in January 2009				
Mean	611	251	456***	207
Median	255	102	162***	100
Age of Owner	35.4	35.9	37.0	41.1
Age of Firm	9.1	6.0	7.4**	9.5
Ever had a formal loan	0.07	0.08	0.15**	0.23
Keeps accounts	0.45	0.31	0.44**	0.29
Years of Education	10.04	7.80	8.63**	9.44
Digitspan Recall	5.70	4.59	4.80	5.68
Chose sector as it had low capital requirements	0.17	0.40	0.32*	n.a.
Chose sector for profit potential	0.18	0.11	0.18**	n.a.
Willingness to Take Risks	5.64	4.28	4.40	6.08
Save regularly	0.71	0.62	0.73**	0.67
Household Asset index	0.29	-0.40	0.14***	n.a.
Household has a Cellphone	0.94	0.88	0.91	0.22
Sample Size	**290**	**296**	**179**	**190**

Notes:
Means shown unless indicated otherwise.
Sample used excludes 7 matched quadruplets (28 firms) which have at least one firm with profits above 1500 cedis per month in wave 1 or 2.
*, **, and *** indicate high profit women statistically different from the low profit women at the 10%, 5% and 1% levels respectively.
a. Figures for Sri Lanka are reported as of March 2005 Sri Lankan baseline, converted at an approximate exchange rate of 100 Sri Lankan rupees to 1 cedi.
n.a. indicates not available in Sri Lankan data.

Table 8: Heterogeneity according to self-control and external pressure

Dependent variable: Real monthly profits

	Pooled								
	Men & Women			High Profit Women		Low Profit Women		Men	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cash Treatment	-1.917	3.864	4.204	16.18	18.44	-5.537	-8.763	5.845	3.828
	(14.50)	(8.887)	(9.139)	(20.78)	(20.01)	(8.819)	(9.886)	(16.93)	(17.86)
In-kind Treatment	27.63**	23.85**	24.72**	66.60**	64.44**	4.832	4.273	15.55	11.29
	(12.35)	(10.15)	(10.54)	(27.08)	(26.06)	(7.562)	(8.049)	(16.77)	(16.88)
Cash Treatment*Low Digitspan Recall	6.504								
	(17.87)								
In-kind Treatment*Low Digitspan Recall	1.568								
	(19.59)								
Cash Treatment * Lack of Self-control		-16.75**	-17.10**	-32.18**	-31.17**	0.917	1.228	-25.98	-26.58
		(8.252)	(8.364)	(15.63)	(15.21)	(7.771)	(8.098)	(18.66)	(18.60)
In-kind Treatment*Lack of Self-control		-3.697	-2.713	-3.676	6.510	-0.932	-1.407	-8.287	-10.07
		(6.341)	(6.598)	(17.33)	(19.32)	(6.488)	(6.706)	(11.82)	(12.10)
Cash Treatment * Narrow External Pressure		4.301		-7.658		13.12		-3.683	
		(7.056)		(12.14)		(9.720)		(14.03)	
In-kind Treatment * Narrow External Pressure		-12.23		-29.93		2.870		-14.53	
		(10.92)		(32.54)		(7.424)		(13.67)	
Cash Treatment * Broad External Pressure			9.586		26.79*		9.773		-3.695
			(7.492)		(13.67)		(9.028)		(14.41)
In-kind Treatment * Broad External Pressure			-10.70		-22.50		3.228		-10.60
			(11.80)		(32.93)		(6.281)		(14.90)
Observations	4,070	3,822	3,691	903	880	1,465	1,412	1,454	1,399
Number of firms	739	664	641	156	152	256	247	252	242
P-values for testing cash=in-kind for:									
Low digitspan interaction	0.844								
Self-control interaction		0.181	0.148	0.203	0.115	0.838	0.778	0.389	0.420
Narrow external pressure interaction		0.356		0.610		0.365		0.569	
Broad external pressure interaction			0.219		0.077		0.555		0.770

Notes: results from fixed effects estimation

Sample trims out 7 matched quadruplets which have at least one firm with profits above 1500 cedis per month in wave 1 or 2

Randomization occurred within matched quadruplets.

Robust standard errors clustered at the firm level in parentheses.

*, ** and *** denote significance at the 10%, 5% and 1% levels.

All regressions also include survey wave effects, which vary with the interaction.

Low Digitspan recall denotes digitspan recall of 5 or lower; lack of self-control is the first principal component of questions on whether the individual used a susu at baseline, whether they saved regularly, whether they had an above median discount rate, and whether they were a hyperbolic discounter; narrow external pressure is the first principal component of questions on whether the individual says there is pressure to share extra profits with others, that whenever there is money on hand, others request it, that people who do well in business receive additional request for money, and that machines and equipment are a good way to save money so others don't take it

Broad external pressure is the first principal component of the same 4 variables as the narrow pressure measure, along with household size, marital status, and presence of siblings in the Accra/Tema area. Loading weights for all principal components are provided in appendix table 4.

Appendix Table A1: Attrition Rates by Round

	All firms	Control	Cash	In-kind	P-value test of equality
Didn't Answer Survey					
Wave 1	0	0	0	0	1
Wave 2	0	0	0	0	1
Wave 3	0.029	0.031	0.010	0.042	0.106
Wave 4	0.073	0.086	0.068	0.052	0.303
Wave 5	0.112	0.131	0.099	0.089	0.262
Wave 6	0.080	0.102	0.047	0.068	0.050
Any Wave	0.166	0.196	0.131	0.141	0.070
Missing profits data					
Wave 1	0.080	0.091	0.071	0.071	0.615
Wave 2	0.016	0.013	0.025	0.010	0.477
Wave 3	0.069	0.076	0.061	0.071	0.740
Wave 4	0.098	0.123	0.076	0.071	0.064
Wave 5	0.129	0.149	0.121	0.106	0.207
Wave 6	0.114	0.141	0.086	0.086	0.059
Any Wave	0.285	0.329	0.236	0.246	0.019
Ever close business	0.064	0.073	0.063	0.047	0.463

Note: Test of equality if based on regression of attrition on treatment group with controls for stratification groups and robust standard errors.

Appendix Table A2: Robustness of Treatment Effect to Lee Bounds

Dependent Variable: Real Monthly Profits (Cedis)

	(1) OLS	(2) FE	(3) OLS	(4) OLS	(5) FE	(6) FE
Cash Treatment*Female	5.167	-2.298	6.093	1.148	-1.441	-3.297
	(8.545)	(8.768)	(8.767)	(7.106)	(8.927)	(7.226)
In-kind Treatment*Female	37.65**	32.87**	40.88***	9.378	35.34***	11.06
	(14.94)	(13.21)	(15.41)	(7.066)	(13.59)	(7.661)
Cash Treatment*Male	16.81	5.132	21.82	6.218	9.154	-5.718
	(13.25)	(16.10)	(13.28)	(11.28)	(16.02)	(13.87)
In-kind Treatment*Male	35.45**	27.83	37.26***	14.71	28.11	8.421
	(14.04)	(18.15)	(14.07)	(10.14)	(18.21)	(14.07)
Lee Bounding	No	No	Upper	Lower	Upper	Lower
Number of Observations	4203	4203	4165	4167	4165	4167
Number of Firms	764	764	764	764	764	764

Notes:

All estimation includes wave effects. Standard errors in parentheses, clustered at the firm level.

Trimmed Sample used for all columns

OLS estimation includes dummies for the matched quadruplets.

*, ** and *** denote significant at the 10%, 5% and 1% levels.

Appendix Table A3: How does Treatment Effect Vary with Time Since Treatment?

Dependent Variable: Real Monthly Profits

	Males and Females Pooled				Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	FE	FE	OLS	FE	OLS	FE
Cash Treatment at 3 months	14.27	9.12	5.89	1.13	5.05	-2.58	11.52	3.25
	(10.26)	(8.01)	(11.23)	(8.31)	(15.03)	(15.86)	(9.15)	(9.24)
Cash Treatment at 6 months	7.18	6.30	-1.36	-2.75	16.11	5.90	-0.18	-8.42
	(9.86)	(9.16)	(17.27)	(10.34)	(17.21)	(20.45)	(10.32)	(10.91)
Cash Treatment at 9 months	12.97	5.99	9.60	3.74	12.64	11.01	2.37	-0.30
	(12.23)	(10.96)	(15.97)	(11.07)	(20.12)	(21.36)	(12.47)	(11.93)
Cash Treatment at 12 months	38.09***	27.98**	17.73	17.01	57.54***	30.41	10.01	8.82
	(13.55)	(12.81)	(23.52)	(13.42)	(20.87)	(25.94)	(16.15)	(14.69)
In-kind Treatment at 3 months	26.37**	26.65**	30.20**	18.86*	33.59	25.34	22.25*	14.81
	(12.10)	(11.42)	(12.64)	(11.36)	(22.86)	(24.82)	(11.89)	(10.06)
In-kind Treatment at 6 months	34.62***	32.61***	38.34***	25.49**	19.12	9.98	41.03***	35.16***
	(11.68)	(11.19)	(12.75)	(10.93)	(15.11)	(18.99)	(15.44)	(13.10)
In-kind Treatment at 9 months	48.33**	48.90**	54.91***	45.24**	39.49**	36.59*	54.76*	50.66*
	(20.63)	(19.96)	(20.25)	(18.50)	(17.33)	(19.41)	(30.35)	(27.33)
In-kind Treatment at 12 months	58.35***	46.91***	78.17***	58.00***	69.76*	75.71**	32.76*	47.10***
	(19.42)	(17.52)	(19.23)	(17.02)	(35.62)	(36.58)	(17.47)	(15.33)
Constant	119.70***	102.20***	120.34***	103.05***	127.88***	128.69***	86.43***	87.33***
	(8.85)	(4.40)	(7.38)	(3.71)	(7.52)	(6.47)	(5.40)	(4.49)
Baseline trimming	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Number of Observations	4354	4203	4354	4203	1599	1599	2604	2604
Number of Firms	792	764	792	764	290	290	474	474
P-value for testing constant effect:								
of Cash Treatments	0.166	0.435	0.262	0.389	0.170	0.534	0.579	0.353
of In-kind Treatments	0.492	0.577	0.121	0.163	0.458	0.249	0.189	0.057

Notes:

All estimation includes wave effects. Standard errors in parentheses, clustered at the firm level.

*, ** and *** denote significant at the 10%, 5% and 1% levels.

Trimmed specifications trim out 7 matched quadruplets (28 firms) which have at least one firm with profits above 1500 cedis per month in wave 1 or 2.

OLS estimation includes dummies for the matched quadruplets.

Appendix Table 4: Principal Component Weights on each variable

Variables	Lacks Self-control index	Broad External Pressure index	Narrow External Pressure index
Used a Susu at Baseline	**-0.30**		
Said they save regularly	-0.28		
Discount rate above median	**0.65**		
Hyperbolic Discounter	**0.64**		
Says there is pressure to share extra profits with other household members		**0.38**	0.25
Whenever there is money on hand, spouse or other family members request some		**0.38**	**0.66**
People who do well in business receive additional requests for money from family/friends		**0.38**	**0.69**
Machines and equipment in business are good way to save money so others don't take it		0.04	0.15
Household Size		**0.53**	
Number of siblings in Accra/Tema area		0.12	
Individual is married		**0.52**	

Appendix Table 5: Treatment Interactions with Individual Variables Proxying for Self-Control and External Pressure

	Female High Profit Group			Female Low Profit Group			Males		
		Interaction with			Interaction with			Interaction with	
	N	Cash	In-kind	N	Cash	In-kind	N	Cash	In-kind
Variables Proxying for Self-Control									
Used a Susu at Baseline	179	25.25	-30.34	295	-8.161	-6.006	290	9.684	-11.96
		(27.77)	(55.13)		(13.73)	(10.09)		(23.75)	(25.29)
Said they save regularly	177	31.10	91.43**	293	23.75	19.21	285	98.93***	44.97
		(28.50)	(44.85)		(24.17)	(14.07)		(30.91)	(32.12)
Discount rate above median	178	-73.60**	67.32	293	9.849	9.963	287	-25.10	22.18
		(34.04)	(55.04)		(20.66)	(15.45)		(33.18)	(35.57)
Hyperbolic Discounter	176	-42.04	-95.56*	293	11.84	-2.493	286	-32.45	-47.82*
		(37.11)	(54.41)		(20.58)	(16.05)		(32.03)	(28.86)
Variables Proxying for External Pressure									
Says there is pressure to share extra profits	159	43.05	29.61	259	0.622	-20.76	257	-27.36	-45.01
with other household members		(33.38)	(59.25)		(17.58)	(14.93)		(36.41)	(35.93)
Whenever there is money on hand, spouse or	179	14.26	21.04	295	40.35**	8.073	290	-26.86	-60.00
other family members request some		(33.71)	(67.21)		(20.38)	(15.94)		(34.01)	(43.54)
People who do well in business receive additional	179	-27.69	-109.6	295	18.47	6.167	290	48.35*	-63.85
requests for money from family/friends		(33.22)	(103.1)		(24.42)	(17.04)		(28.33)	(60.58)
Machines and equipment in business are good way to	179	-30.20	44.44	295	16.80	2.346	290	-63.21*	-74.40
save money so others don't take it		(33.37)	(62.62)		(20.22)	(15.61)		(37.60)	(54.14)
Household Size	177	29.48*	-6.989	294	3.673	1.825	286	-0.358	3.360
		(14.95)	(18.41)		(3.864)	(3.143)		(8.609)	(8.438)
Number of siblings in Accra/Tema area	155	12.25*	5.382	249	3.231	5.355*	248	-6.184	4.575
		(6.936)	(13.35)		(4.268)	(2.792)		(5.751)	(5.992)
Individual is married	179	63.09*	-21.42	294	-14.08	2.903	289	-17.11	-12.19
		(35.93)	(78.14)		(18.14)	(14.56)		(33.14)	(34.08)

Appendix Table A6: Treatment Heterogeneity by Randomization Strata (results on the untrimmed sample) (compare to Table 4)

Dependent Variable: Real Monthly Profits (Cedi)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Interaction Category A	Single-Sex Industry		Low Capture		Low Capital		Low Profits	
Interaction Category B	Mixed Industry		High Capture		High Capital		High Profits	
Panel A: Females								
Cash Treatment*Category A	9.56	0.67	2.12	-8.53	3.23	-4.87	3.29	-8.58
	(9.933)	(12.699)	(12.391)	(13.547)	(10.472)	(13.103)	(7.151)	(9.652)
Cash Treatment*Category B	1.44	1.78	7.84	10.74	8.28	8.98	6.82	15.40
	(13.366)	(13.470)	(11.804)	(12.776)	(14.040)	(13.055)	(19.994)	(18.616)
In-kind Treatment*Category A	22.70	31.14*	28.35	35.41	12.98	19.37	2.21	4.58
	(14.640)	(18.235)	(23.015)	(24.069)	(11.118)	(11.982)	(6.971)	(7.519)
In-kind Treatment*Category B	48.26*	39.77**	42.64***	35.95***	65.07**	55.67**	89.63**	82.59***
	(25.603)	(19.943)	(14.500)	(13.836)	(30.221)	(26.189)	(36.513)	(31.296)
Number of Observations	2,628	2,628	2,628	2,628	2,628	2,628	2,628	2,628
Number of Firms	478	478	478	478	478	478	478	478
P-values for testing:								
Cash Treatments equal	0.626	0.952	0.740	0.301	0.775	0.454	0.868	0.253
In-kind Treatments equal	0.387	0.750	0.567	0.985	0.105	0.208	0.019	0.016
Cash=In-kind	0.200	0.066	0.098	0.067	0.188	0.057	0.152	0.060
Panel B: Males								
Cash Treatment*Category A	-4.07	22.99	-1.67	37.60	6.94	18.33	18.57	28.88
	(17.908)	(33.812)	(23.681)	(39.348)	(19.607)	(27.931)	(15.431)	(28.730)
Cash Treatment*Category B	60.03**	-4.21	44.71*	-9.26	46.16*	0.04	37.55	-10.48
	(28.970)	(53.940)	(23.900)	(44.143)	(26.387)	(49.642)	(30.539)	(52.120)
In-kind Treatment*Category A	39.05*	51.49	41.30	90.79**	52.32***	39.55	36.29*	62.35*
	(23.024)	(39.321)	(29.411)	(46.014)	(20.082)	(32.385)	(19.594)	(34.822)
In-kind Treatment*Category B	47.88**	58.89**	45.72**	33.62	34.75	65.34**	48.96*	47.68
	(24.173)	(25.922)	(20.339)	(24.405)	(25.136)	(32.066)	(26.586)	(30.633)
Observations	1,726	1,726	1,726	1,726	1,726	1,726	1,726	1,726
Number of Firms	314	314	314	314	314	314	314	314
P-values for testing:								
Cash Treatments equal	0.061	0.670	0.180	0.429	0.225	0.748	0.580	0.509
In-kind Treatments equal	0.792	0.875	0.902	0.273	0.586	0.572	0.702	0.752
Cash=In-kind	0.236	0.363	0.261	0.192	0.164	0.324	0.698	0.240

Notes:

All estimation includes wave effects which vary by category. Standard errors in parentheses, clustered at the firm level. Randomization occurred within matched quadruplets. OLS estimation includes dummies for these strata.

*, ** and *** denote significant at the 10%, 5% and 1% levels.

Table A7: Where do the grants go? Results on non-trimmed sample
(compare Table 6)

	Capital Stock FE	Truncated Capital Stock FE	Made a Transfer Out OLS	Amount Transferred Out OLS	Weekly Food Spending FE	Quarterly Clothing Spending FE	Quarterly Health & Education Spending FE	Quarterly Ceremonies Spending FE	Total Annual Spending FE	Log Annual Spending FE
Panel A: Males and Females										
Cash Treatment*Female	83.02	49.86	0.04*	7.49**	3.49	5.01	1.31	0.44	120.79***	0.09**
	(71.455)	(36.978)	(0.026)	(3.462)	(2.427)	(3.953)	(3.144)	(13.250)	(45.324)	(0.042)
In-kind Treatment*Female	134.75**	119.78***	0.01	1.26	-0.00	1.21	2.21	-4.80	53.36	0.01
	(64.985)	(34.218)	(0.027)	(2.927)	(2.575)	(4.414)	(3.442)	(12.929)	(44.027)	(0.040)
Cash Treatment*Male	63.99	37.06	0.02	-4.91	6.47	16.48**	0.31	-4.54	105.04*	0.04
	(71.192)	(63.622)	(0.041)	(3.837)	(4.178)	(7.804)	(4.887)	(12.706)	(60.788)	(0.039)
In-kind Treatment*Male	232.51**	164.82**	0.03	-3.90	-2.42	3.02	2.50	4.14	29.94	-0.00
	(103.032)	(77.870)	(0.041)	(3.866)	(3.187)	(5.829)	(4.919)	(21.023)	(60.616)	(0.051)
Number of Observations	4,412	4,412	2,106	2,106	4,423	4,061	4,442	3,857	4,654	4,456
Number of Firms	793	793	793	793	793	789	793	781	793	793
P-values testing:										
Cash = In-kind Females	0.577	0.110	0.295	0.270	0.245	0.483	0.824	0.765	0.219	0.123
Cash = In-kind Males	0.112	0.146	0.865	0.888	0.067	0.144	0.730	0.715	0.340	0.483
Panel B: Female Sub-sample										
Cash Treatment*Low Profits	-6.78	-6.78	0.07**	6.13**	7.26**	4.66	2.94	15.39	197.84***	0.16**
	(29.686)	(29.686)	(0.034)	(2.802)	(3.318)	(4.241)	(4.106)	(18.928)	(58.163)	(0.062)
Cash Treatment*High Profits	235.08	145.11*	0.01	9.94	-2.66	8.38	-7.85	-22.70	-57.70	-0.07
	(181.365)	(83.839)	(0.042)	(8.243)	(4.211)	(7.863)	(5.381)	(18.345)	(80.524)	(0.059)
In-kind Treatment*Low Profits	59.17**	59.17**	0.01	-0.40	1.11	4.10	-2.38	3.83	32.92	-0.02
	(28.454)	(28.454)	(0.034)	(2.023)	(3.934)	(5.197)	(3.093)	(18.804)	(63.979)	(0.058)
In-kind Treatment*High Profits	257.76	219.33***	0.02	3.77	-1.64	-1.96	2.96	-16.48	31.24	0.00
	(162.450)	(75.897)	(0.045)	(6.719)	(3.898)	(7.812)	(7.689)	(16.938)	(67.776)	(0.065)
Number of Observations	2,678	2,678	1,272	1,272	2,679	2,464	2,689	2,345	2,814	2,694
Number of Firms	479	479	479	479	479	479	479	472	479	479
P-values testing:										
Cash Treatments Equal	0.189	0.088	0.139	0.662	0.065	0.678	0.112	0.149	0.010	0.007
In-kind Treatments Equal	0.229	0.049	0.806	0.553	0.620	0.519	0.520	0.423	0.986	0.810

Notes:

Randomization occurred within matched quadruplets. OLS estimation includes dummies for these strata.

All expenditure data are truncated at the 99.5th percentile of the follow-up data.

All estimation includes wave effects which vary by gender, and by category in panel B. Standard errors in parentheses, clustered at the firm level.

High and Low profits refers to groups defined on pre-treatment profits.

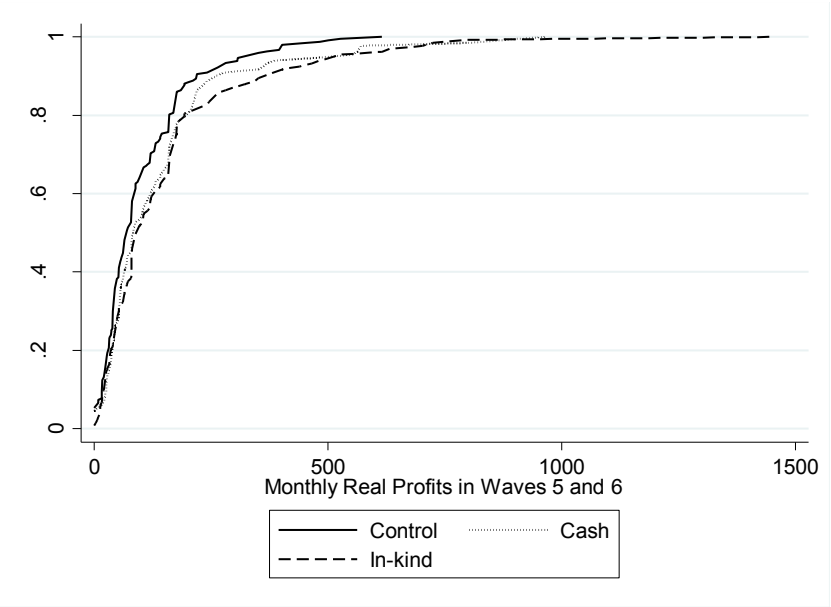
*, ** and *** denote significant at the 10%, 5% and 1% levels.

Table A8: Heterogeneity according to self-control and external pressure (untrimmed sample)
(compare Table 8)
Dependent variable: Real monthly profits

	Pooled								
	Men & Women			High Profit Women		Low Profit Women		Men	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cash Treatment	-11.22	8.436	8.236	25.10	28.80	-5.537	-8.763	13.15	8.787
	(33.03)	(15.16)	(16.18)	(21.65)	(21.68)	(8.819)	(9.886)	(32.63)	(36.82)
In-kind Treatment	39.64**	37.65***	39.19***	72.06**	71.38***	4.832	4.273	45.82*	44.32*
	(18.66)	(12.27)	(12.72)	(27.88)	(27.14)	(7.562)	(8.049)	(23.65)	(24.07)
Cash Treatment*Low Digitspan Recall	26.03								
	(35.43)								
In-kind Treatment*Low Digitspan Recall	2.213								
	(24.76)								
Cash Treatment * Lack of Self-control		-24.42**	-24.32**	-40.96**	-40.66**	0.917	1.228	-43.47**	-43.48*
		(10.04)	(10.36)	(19.40)	(19.49)	(7.771)	(8.098)	(21.87)	(22.21)
In-kind Treatment*Lack of Self-control		-7.817	-7.067	-14.88	-5.347	-0.932	-1.407	-11.00	-13.95
		(8.281)	(8.653)	(21.12)	(22.99)	(6.488)	(6.706)	(15.65)	(16.30)
Cash Treatment * Narrow External Pressure		3.200		-2.008		13.12		-12.27	
		(9.935)		(12.70)		(9.720)		(22.27)	
In-kind Treatment * Narrow External Pressure		-8.274		-26.18		2.870		-12.87	
		(11.18)		(32.60)		(7.424)		(16.22)	
Cash Treatment * Broad External Pressure			1.095		22.37		9.773		-19.64
			(15.08)		(14.61)		(9.028)		(32.36)
In-kind Treatment * Broad External Pressure			-7.240		-27.86		3.228		-1.823
			(14.22)		(33.43)		(6.281)		(22.97)
Observations	4,221	3,969	3,838	927	904	1,465	1,412	1,577	1,522
Number of firms	767	690	667	160	156	256	247	274	264
P-values for testing cash=in-kind for:									
Low digitspan interaction	0.527								
Self-control interaction		0.091	0.085	0.238	0.133	0.838	0.778	0.111	0.148
Narrow external pressure interaction		0.652		0.721		0.365		0.705	
Broad external pressure interaction			0.836		0.135		0.555		0.805

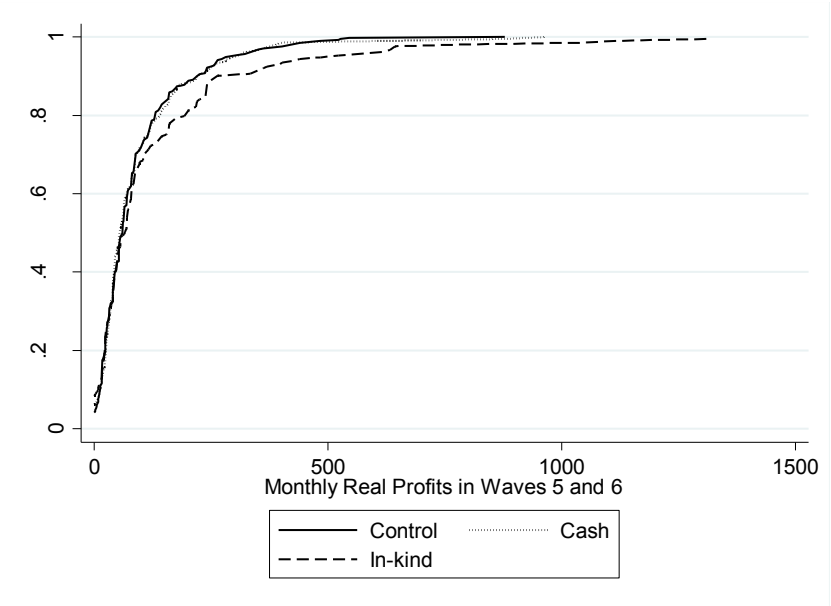
Notes: results from fixed effects estimation
Randomization occurred within matched quadruplets.
Robust standard errors clustered at the firm level in parentheses.
*, ** and *** denote significance at the 10%, 5% and 1% levels.
All regressions also include survey wave effects, which vary with the interaction.
Low Digitspan recall denotes digitspan recall of 5 or lower; lack of self-control is the first principal component of questions on whether the individual used a susu at baseline, whether they saved regularly, whether they had an above median discount rate, and whether they were a hyperbolic discounter; narrow external pressure is the first principal component of questions on whether the individual says there is pressure to share extra profits with others, that whenever there is money on hand, others request it, that people who do well in business receive additional request for money, and that machines and equipment are a good way to save money so others don't take it
Broad external pressure is the first principal component of the same 4 variables as the narrow pressure measure, along with household size, marital status, and presence of siblings in the Accra/Tema area. Loading weights for all principal components are provided in appendix table 4.

Figure 1: Post-treatment CDFs of Monthly Profits for Males by Treatment Group



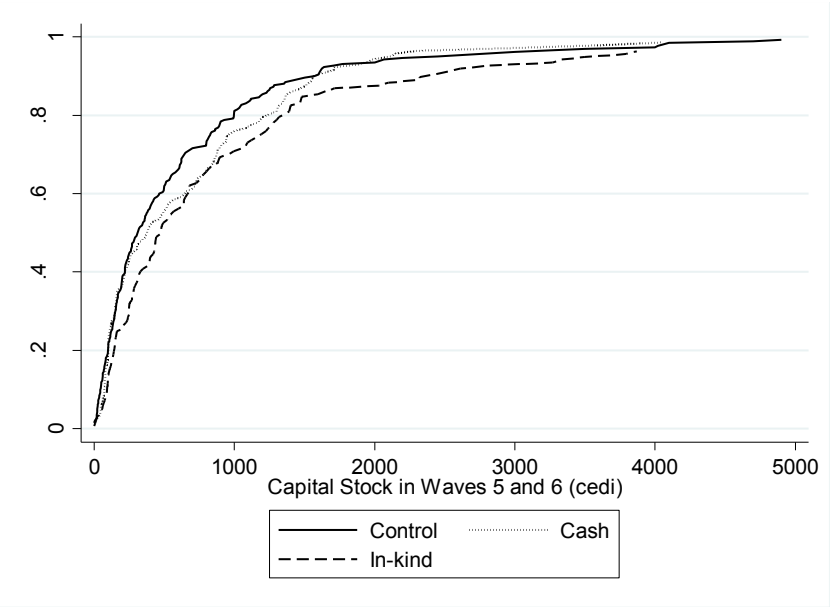
Wilcoxon rank-sum tests of equality of distribution p-values: Control vs Cash 0.025; Control vs In-Kind 0.005; Cash vs In-Kind 0.619

Figure 2: Post-treatment CDFs of Monthly Profits for Females by Treatment Group



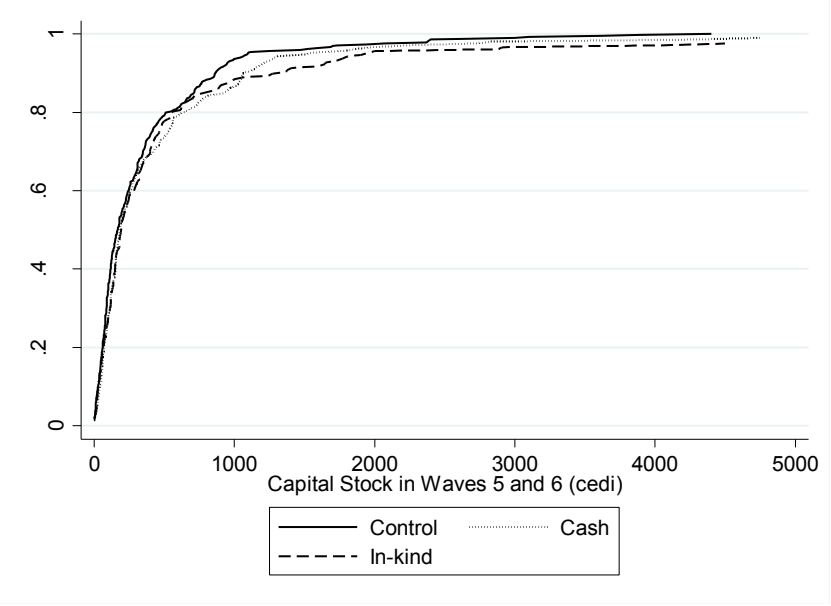
Wilcoxon rank-sum tests of equality of distribution p-values: Control vs Cash 0.981; Control vs In-Kind 0.301; Cash vs In-Kind 0.384

Figure 3: Post-treatment CDFs of Capital Stock for Males by Treatment Group



Wilcoxon rank-sum tests of equality of distribution p-values: Control vs Cash 0.271; Control vs In-Kind 0.004; Cash vs In-Kind 0.120

Figure 4: Post-treatment CDFs of Capital Stock for Females by Treatment Group



Wilcoxon rank-sum tests of equality of distribution p-values: Control vs Cash 0.079; Control vs In-Kind 0.131; Cash vs In-Kind 0.899