Can Basic Entrepreneurship Transform the Economic Lives of the Poor?

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ABSTRACT

Does the lack of capital and skills drive occupational choice and poverty? We provide evidence from a large scale and long term randomized control trial of a programme that simultaneously provides assets and training to the poorest women in treatment communities in rural Bangladesh. The evaluation tracks 7000 eligible women over four years in treatment and control communities. We find the programme transforms the occupational choices of the poor: treated women spend 92% more hours in self-employment activities, and 26% less hours in wage employment. This shift from insecure wage labour to self-employment is associated with a 38% increase in earnings. The eligible women, who were largely asset-less and illiterate agricultural labourers at baseline, overtake the near-poor and begin to close the gap with middle class women on dimensions such as occupational choice, regularity of earnings, household per capita expenditure and happiness. Inculcating basic entrepreneurship, where the most disadvantaged women take on business activities which hitherto had been the preserve of non-poor women, is shown to be a powerful means of transforming the economic lives of the poor.

Keywords: asset transfers, capital constraints, occupational choice.
JEL Classification: O12; I30; D50.

1. INTRODUCTION

The world's poor lack both capital and skills. They tend to engage in low-skilled wage labour activities that are typically insecure and seasonal in nature (Banerjee and Duflo 2007).[1] The non-poor, in contrast, tend to be engaged in secure wage employment or to employ others in the small-scale businesses they operate (Banerjee and Duflo 2008). Any attempt to alleviate extreme poverty on a large scale therefore requires us to think about catalyzing the process of occupational change by understanding how it is linked to a paucity of capital and skills. Although there is a distinguished and growing literature in macroeconomics that documents how occupational change and aggregate development proceed together (Murphy, Shleifer and Vishny 1989, Caselli and Coleman 2001), (Ngai and Pissarides 2007), (Buera and Kaboski 2012), far less is known about the causal link between the lack of capital and skills and occupational choice and poverty.

Economic theory highlights mechanisms via which expanded access to capital enables individuals to alter their occupational choices and exit poverty (Banerjee and Newman 1993, King and Levine 1993, Besley 1995, Morduch and Karlan 2009, Townsend 2011) and how limited human capital formation constrains occupational choices and the ability to escape poverty (Becker 1964, Schultz 1961, 1980). In line with this, many antipoverty programmes target *either* a lack of capital- for instance through microfinance or asset transfer programmes- or of skills - for instance through vocational training or cash transfers conditioned on school attendance. It is, however, seldom possible to evaluate the effects of these programmes on occupational choice; rather, the effects examined tend to be on the *intensive* margin, for individuals staying in the same occupation.

This paper attempts to partly fill the gap between studies of occupational change driving economic development that concern macroeconomists, and microeconomic work evaluating programmes that relax credit or skills constraints. Our focus is on in situ occupational change where the rural poor upgrade to more secure, less seasonal business activities rather than on the shift of rural labourers into manufacturing and service sector jobs in cities.[2] We ask whether tackling both capital and skills constraints *simultaneously* by providing business asset transfers coupled with complementary and intense training, can transform the economic lives of some of the worlds poorest.

To answer this question, we collabourated with the NGO BRAC to implement a large-scale randomized control trial to evaluate their 'Targeting the Ultra-Poor' (TUP) programme in rural Bangladesh. Eligible women are offered a menu of possible business activities, ranging from livestock rearing to small retail operations, and intensive training and assistance in running their businesses.

The scale of the programme combined with the size of the transfers implies that, taken as a whole, the ultra poor programme in Bangladesh represents a significant attempt to lift large numbers of women, and their dependents, out of extreme poverty. Indeed, as of 2011, the TUP programme was already reaching close to 400,000 women and a further 250,000 are meant to be reached between 2012 and

[1] Agricultural labourers, which often constitute the bottom stratum of society in developing countries, are confronted not only with seasonal and weather-dependent demand for their labour but also with barriers to other forms of employment owing to their limited capital and skills (Dreze and Sen 1989). Large swathes of humanity remain in these tenuous occupations.

[2] In situ occupational change involving modest changes in the activities of poor, rural citizens, sometimes referred to as subsistence entrepreneurship, can play a major role in poverty reduction but is distinct from business start-ups in manufacturing and services which have the potential to grow to a significant size (Schoar 2009). The latter, which are the traditional focus on the study of entrepreneurship in developed countries are also important in Bangladesh (e.g. in the readymade garment sector) but tend to be located in urban areas and are therefore not the focus of this study.

2016.[3] The programme gives a big push on both capital (at $140 the value of the asset transfer is worth roughly ten times baseline livestock wealth) and skills (the value of the training and assistance which women receive for two years is worth a similar amount).

In the context of our study, the rural poor are faced with a choice between wage employment (mainly as agricultural labourers and domestic servants) and self-employment (mainly in livestock rearing). The programme influences this choice by increasing wealth via the asset transfer and the returns to self-employment via skills training.[4] We develop a simple model to understand the occupational choices that targeted poor women make at baseline and how the programme affects these choices on their extensive and intensive margins in terms of labour supplied to each activity. The model shows that both the asset transfer and skills provision components reduce hours devoted to wage employment, through both a wealth and a substitution effect. The model also illustrates how the effect of both components on self-employment hours and labour force participation is heterogeneous depending on whether individuals face a binding capital constraint at baseline and the effect of the programme on occupational choices is theoretically ambiguous.

The evaluation sample covers 1409 communities in 40 regions in rural Bangladesh, half of which were treated in 2007 and the rest kept as controls until 2011. BRAC programme officers select potential beneficiaries in 2007 following the same selection criteria in treatment and control communities. We survey and track *all* eligible households, as well as a 10% random sample of non-eligible households from across other wealth classes in the same treated and control communities. We identify the effect of the programme by a difference in difference estimate that compares the outcome of the eligible poor in treated versus control communities before and after programme implementation.

Given our focus on occupational change towards basic entrepreneurship, where new business activities take time to develop, we survey households two and four years after the implementation of the programme. This helps trace out the economic trajectories of poor women over an extended period, shedding light on whether the labour productivity of poor women improves over time as they become more adept at running their new businesses, and it also means that we move well beyond the time when targeted women were receiving direct assistance from BRAC, and the TUP programme becomes entirely free-standing.

The partial population experiment (Moffitt 2001) allows us to benchmark the magnitude of the programme effects for any given outcome, vis-à-vis the magnitude of the baseline difference in that outcome between the eligible poor and those in other wealth classes. In terms of occupational structure at baseline, moving up the wealth distribution, there is clear graduation among women away from wage labour and towards self-employment. A key question then is whether the simultaneous provision of

[3] In Bangladesh the TUP programme is known as the specially targeted ultra poor programme (BRAC 2011). Another variant, known as the other targeted poor programme, is targeted at slightly less disadvantaged women and the asset does not come for free but rather is purchased using a BRAC loan. This variant was reaching 600,000 beneficiaries in 2011 and will reach a further 150,000 by 2016. Non experimental evaluations of the programme (comparing the targeted poor to near poor households) have been reported in Ahmed *et al.* (2009) and Emran *et al.* (2009), tracking over 5000 households from 2002 to 2005. Both studies also found significant impacts on per capital consumption and improvements in food security. Das and Misha (2010) extend the panel to 2008 and find long term impacts on income, food security and asset holdings.

[4] There are of course reasons to be skeptical about whether antipoverty programmes of any stripe can affect occupational choice. The very poor may not demand any capital if they perceive little use for it (Townsend 2011). They may not wish to invest in their own human capital or that of their children if the returns to this investment are perceived to be low (Jensen 2010, 2012). The scale of the intervention may be insufficient to enable the very poor to set up new businesses or to engage in secure wage employment (Banerjee 2004), a criticism often leveled at microfinance where loan sizes may be too small to allow borrowers to effect a change in business activity or transformative entrepreneurship (Schoar 2009). Self-control or other behavioral biases may lead the very poor to consume transfers without altering their occupational choices (Banerjee and Mullanaithan 2010). Leakage may mean that the poor receive a very small fraction of the intended assistance (Reinikka and Svensson 2004). Finally, Field *et al.* (2010) present evidence from a field experiment on how social norms and rules constrain the occupational choices of women in rural India.

assets and skills to eligible women enables them to reallocate their labour supply to more closely resemble the occupational choices of wealthier women in the same communities.

The data confirm that the programme successfully targets the very poorest women in rural Bangladesh: at baseline more than half (52%) own no productive assets, 93% are illiterate and 38% are the sole earner in their households. They typically engage in multiple occupations, none of which held regularly, with most being characterized by income seasonality. The precariousness of their economic lives though striking, is not atypical of the situation that millions of rural women across the developing world find themselves in.[5] In contrast, richer women in the same communities typically shun wage employment and are engaged in fewer, more regular, activities with most of them specializing in self-employment either rearing livestock or cultivating land.

We document a causal link from the lack of capital and skills to occupational choice, and ultimately poverty and insecurity. On the extensive margin, the share of women specialized in wage employment drops by 17 percentage points (pp), corresponding to 65% of the baseline mean. Over the same period, the share of women specialized in self-employment increases by 15pp and those engaged in both occupations by 8pp. These changes on the extensive margin of occupational choice correspond to 50% and 31% increases from their baseline values, respectively.

This dramatic change in occupational choice on the extensive margin is accompanied by a corresponding change in hours devoted to the two occupation categories. After four years, eligible women work 170 fewer hours per year in wage employment (a 26% reduction relative to baseline) and 388 more hours in self-employment (a 92% increase relative to baseline). Hence, total annual labour supply increases by an additional 218 hours. Given the occupational change induced, their labour supply becomes more regular, while income seasonality is reduced. The change in occupational structure is associated with a 15% increase in labour productivity and a 38% increase in earnings. This leads to a 8% increase in household per capita expenditure, and a 15% increase in self-reported life satisfaction among eligible women. Measures of estimated effects are typically more pronounced after four years relative to after two years, indicating that the programme sets beneficiaries on a sustainable path out of poverty.

Two further findings are of note. First, quantile treatment effect estimates reveal that the effect on earnings and expenditures is positive at all deciles, but both effects are substantially larger for the top four deciles after four years. This indicates that the programme increases both the mean and the dispersion of total earnings among the treated. Second, benchmarking the magnitude of the programme impact relative to differences in the same outcome between the eligible poor and other wealth classes, we find the eligible poor: (i) overtake the near-poor on a host of economic indicators; (ii) they close around 40% of the gap to middle class households on metrics related to occupational choice and earnings. In this regard it is important to make precise that we define middle class as those in the middle wealth category as defined by the participatory ranking exercise within the rural communities we study. The term therefore does not refer to what might be understood as middle class as a whole within Bangladesh.

In summary, our findings demonstrate a clear causal link from the lack of capital and skills to occupational choice, and show that relaxing these constraints can set the poor on a sustainable path out of poverty that brings them closer to the middle classes in their communities. We thus contribute evidence based on a large scale and long term randomized control trial to the extensive theoretical literature that analyzes occupational choices in developing countries and the role of capital and skills constraints in alleviating poverty and determining economic growth (Aghion *et al.* 2005, Banerjee and Newman 1993).

[5] It is well documented that landless agricultural labourers, such as the eligible women here, are exposed to seasonal hunger and famine - monga - as it is referred to in Bangladesh (Bryan *et al.* 2011, Khandker and Mahmud 2012). Monga is the result of limited demand for agricultural labour in the pre-harvest period, and as discussed by Bryan *et al.* (2011), similar phenomena exist across South Asia and Sub – Saharan Africa.

The programme is being piloted in a wide variety of countries and by a wide variety of organizations.[6] This experimentation in different contexts is critical to ascertaining whether or not this type of programme can be used to fight poverty on a global scale. Findings from pilots in India are consistent with ours. Banerjee *et al.* (2011) find that a pilot in West Bengal has effects on consumption expenditures, earnings and food security which are of similar magnitude to those we report. Morduch *et al.* (2012) find that a pilot in Andhra Pradesh has weak impacts on earnings and consumption, mostly due to the fact that the Government of Andhra Pradesh simultaneously introduced a guaranteed-employment scheme that substantially increased earnings and expenditures in the control group.

The paper is organized as follows. Section 2 develops an occupational choice model to make precise how the TUP programme impacts decisions on the extensive and intensive margins. Section 3 describes the TUP programme, our research design and data. Section 4 presents the main results that closely map to the model developed on occupational choice, earnings and labour productivity. Section 5 presents estimates on asset holdings, expenditures and well-being; quantile treatment effect estimates to document the heterogeneous impacts among the eligible poor; and benchmarks the magnitude of the impacts for the core outcomes, vis-à-vis the magnitude of the baseline difference in that outcome between the eligible poor and other wealth classes. Section 6 conducts a cost benefit analysis of the programme and compares its benefits to the counterfactual policy of unconditional cash transfers. Section 7 discusses the implications of our study on the links between capital, skills, occupational change and poverty in low income settings. All proofs and robustness checks are in the Appendix.

[6] As of January 2013, ten different pilots were active around the world, http://graduation.cgap.org/pilots/

2. THEORETICAL FRAMEWORK

We develop a model to highlight how the poor allocate their time between leisure and the two occupations most common in the communities we study: wage employment and self-employment. The model then makes precise how the programme impacts equilibrium occupational choices of the eligible poor through two channels: (i) asset transfers, which boost resource endowments; and (ii) skills training, that boost the returns to self-employment.

2.1 Set-up

Individuals live one period and are endowed with one unit of time to allocate between wage employment (L_i), self-employment (S_i) and leisure (R_i). Individual i decides which occupations to enter on the extensive margin, and how much labour to supply to each occupation on the intensive margin. We assume the time devoted to occupational activities must be non-negative, and utility is additively separable in consumption (C_i) and leisure: $U_i = u(c_i) + v(R_i)$, where $u(.)$ and $v(.)$ are concave. Individuals are price-takers in the labour market being paid a wage w per unit of time, so earnings from wage employment are wL_i.[7] Time devoted to self-employment (S_i) is combined with assets K_i to produce output Y_i, according to a production function $Y_i = f(\theta_i, K_i, S_i)$, where θ_i measures individual i 's skills. In our study context, this form of self-employment corresponds to engaging in basic entrepreneurial activities, in which labour is combined with assets in the form of livestock and related inputs such as feed and fodder; output from such self-employment corresponds to milk, meat and egg produce for sale in local markets. The price of livestock assets is p_k and the price of output is p_y. Individuals are assumed to be price-takers in input and output markets. Earnings from self-employment are then given by $\pi_i = p_y f(\theta_i, K_i, S_i) - p_k K_i$.

Individuals have a resource endowment (I_i) that can be used to purchase consumption or assets. The budget constraint for consumption is then $wL_i + \pi_i + I_i = C_i$. Finally, we assume credit markets are such that individuals face the constraint $p_k K_i \leq I_i$, namely individuals cannot borrow against their endowment to finance current assets purchases. This captures the fact that, although some credit is available in the study communities, the poor only have access to small scale loans. Such micro-loans are insufficient to allow them to purchase lumpy livestock assets. Assuming less severe forms of credit market imperfections would yield similar results.

Substituting C_i from the budget constraint yields the Lagrangian:

$$max_{L_i, S_i} \ell = u(wL_i + \pi_i + I_i) + v(1 - L_i - S_i) + \alpha L_i + \beta S_i + \gamma(I_i - p_k K_i), \quad \text{..... (1)}$$

where α and β are the multipliers associated with the non-negativity constraints on time devoted to wage and self-employment and γ is the multiplier associated with the assets constraint. All multipliers

[7] As we focus on the occupational choices of the poor, we rule out the possibility that labour can be hired in for either occupation. This is an accurate empirical description for the eligible poor households we focus on. For expositional ease, we also abstract from skills differences in the labour market and assume w is the same for all individuals. This reflects the fact that the study population is mostly unskilled and supplies labour in two competitive wage labour markets: for agricultural casual labourers and for domestic servants. The model predictions regarding the programme impacts on the treated poor are robust to individuals earning different wages. Any predictions regarding the general equilibrium effect of the programme on wages and the pecuniary externalities on non-treated individuals (that are examined in more detail in Bandiera *et al.* (2012), would however depend on the skill distribution in the two populations and the degree of substitutability between skills.

must be non-negative. To obtain closed form solutions we further assume that $Y = \theta_i min(K_i, S_i)$, so that in equilibrium $K_i = S_i$ and $\pi_i = p_y\theta_i S_i - p_k S_i = r_i S_i$, where $r_i = p_y\theta_i - p_k$ then measures the individual specific returns to self-employment.[8]

2.2 Occupational choices at baseline

The individual's optimal occupational choices are a function of two exogenous variables: (i) skills, namely the returns to self-employment relative to wage employment ($r_i \lessgtr w$); (ii) resource endowments, I_i. The former determines the choice between self-employment and wage employment, whereas the latter determines labour force participation and whether the assets constraint binds when the individual chooses to engage in self-employment. Equilibrium baseline occupational choices in all parts of the parameter space are summarized as follows.

Proposition 1: Individuals will be in one of the four following states:

(a) out of the labour force if: $r_i > w$ and $I_i \geq \tilde{I}_i(r_i)$; or $r_i < w$ and $I_i \geq \hat{I}_i(w_i)$;

(b) engaged solely in self-employment if: $r_i > w$ and $I_i \in [\tilde{\tilde{I}}_i(r_i, w), \tilde{I}_i(r_i))$;

(c) engaged solely in wage employment if: $r_i < w$ and $I_i < \hat{I}_i(w_i)$;

(d) engaged in both occupations if: $r_i > w$ and $I_i \leq \tilde{\tilde{I}}_i(r_i, w)$

Figure 1A illustrates the occupational choice equilibrium if $r_i \geq w$. The resource endowment (I_i) is measured on the horizontal axis. The vertical axis shows the wage and self-employment labour supply functions ($L_i^*(.), S_i^*(.)$). The proof of Proposition 1, provided in the Appendix A, derives the resource endowment thresholds $\tilde{I}_i(r_i), \tilde{\tilde{I}}_i(r_i), \tilde{\tilde{I}}_i(r_i, w))$, the wage and self-employment labour supply functions, and their comparative statics with respect to wages, returns to self-employment and resource endowments.

[8] The assumption of Leontief technology is made for expositional convenience and allows us to only have to keep track of either the amount of self-employment S_i or the amount of capital, K_i. Allowing some substitutability between these factor inputs will not alter the qualitative nature of trade-offs identified.

Figure 1A. Occupational choice equilibrium: $r_i > w$

Time allocated to wage labour, self-employment

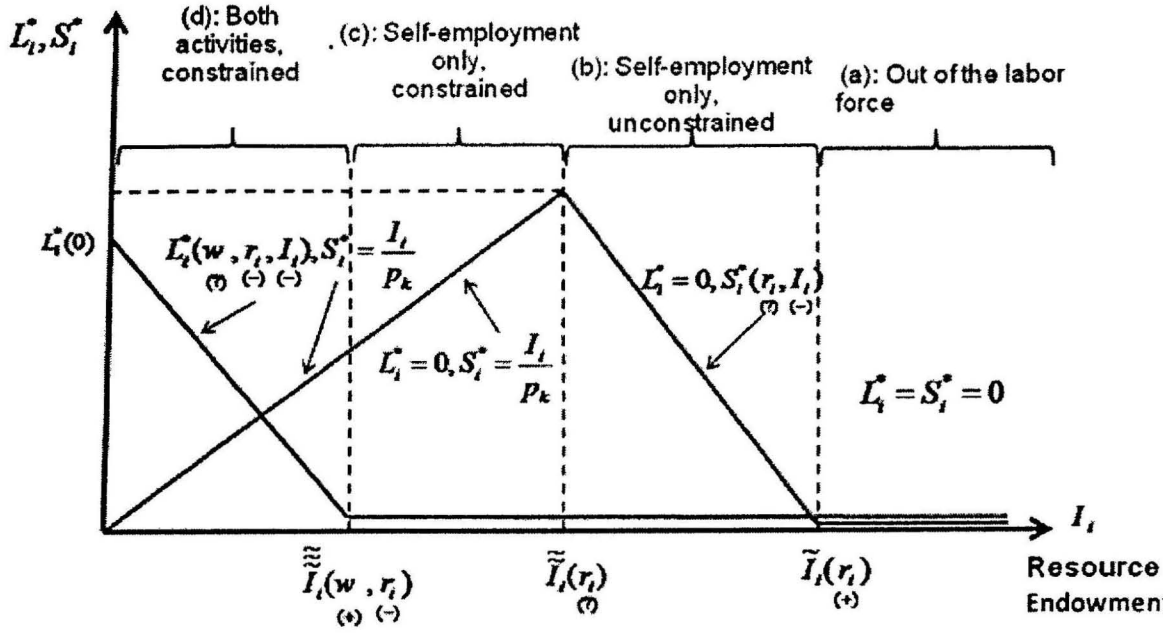
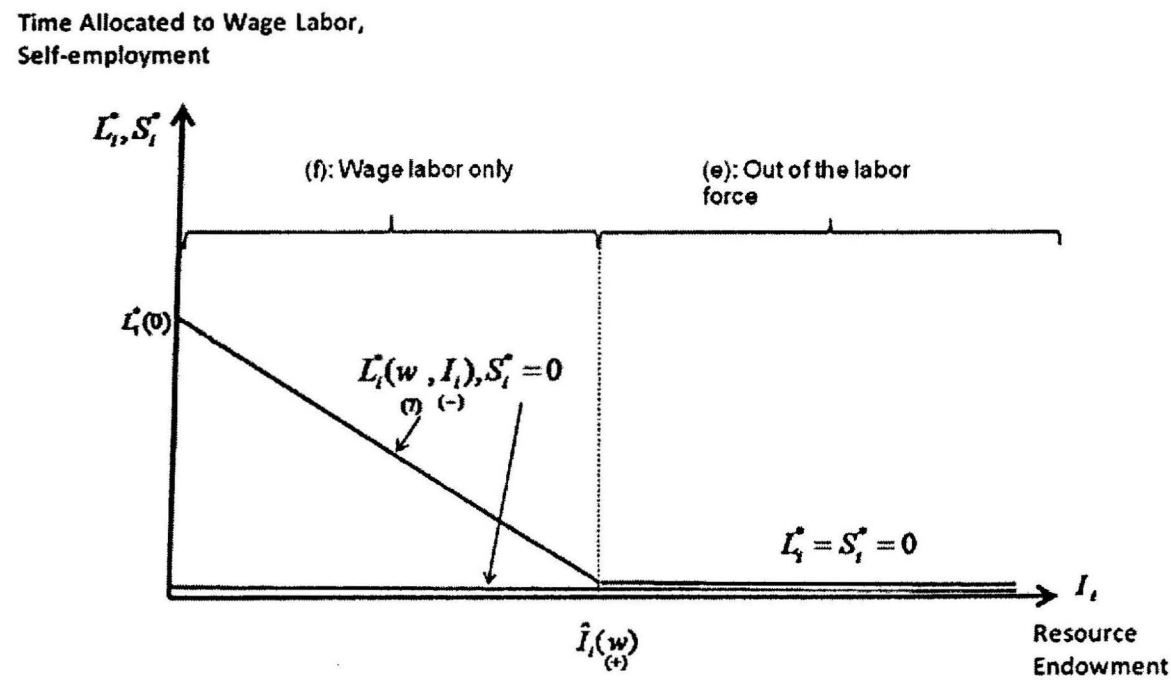


Figure 1B. Occupational choice equilibrium $r_i < w$



Starting from the extreme right hand side of Figure 1A, we see that individuals with the highest endowments optimally choose to stay out of the labour force (case a, where $L_i^* = S_i^* = 0$ for $I_i \geq \tilde{I}_i(r_i)$). In the more central section of Figure 1A we have a group of individuals that are not assets constrained and so, because we are considering the scenario where $r_i > w$, engage *solely* in self-employment (case b, where $L_i^* = 0, S_i^* > 0$ for $I_i \in [\tilde{\tilde{I}}_i(r_i), \tilde{I}_i(r_i))$). The next group of individuals also engage solely in self-employment but are limited in scale by their available resource endowment ($p_k K_i = I_i$) (case c, where $L_i^* = 0, S_i^* > 0$ for $I_i \in [\tilde{\tilde{\tilde{I}}}_i(r_i, w), \tilde{\tilde{I}}_i(r_i))$). Finally, on the left hand side of Figure 1A we see that individuals with the smallest resource endowments engage in both occupations, as the feasible scale of self-employment activities is too small to afford the desired level of consumption (case d, where $L_i^* > 0, S_i^* > 0$ for $I_i \leq \tilde{\tilde{\tilde{I}}}_i(r_i, w)$).[9]

The model shows that total labour supply, $L_i^*(.) + S_i^*(.)$, need not monotonically decrease in resource endowments, I_i. This emphasizes that the TUP programme, that affects resource endowments through livestock asset transfers, impacts not just occupational choices on the intensive and extensive margins, but also the total hours devoted to non-leisure activities. We factor in such changes to total labour supply (hence leisure) when later conducting a cost-benefit analysis of the programme.

Figure 1B shows the pattern of equilibrium occupational choices and corresponding labour supplies when $r_i < w$ (in the proof (Appendix A) we derive the relevant resource endowment threshold in this case, $\hat{I}_i(w_i)$). In this scenario, no household specializes in self-employment and so the assets constraint plays a far weaker role in determining occupational choice. Figure 1B shows that individuals with sufficiently high resource endowments optimally choose to stay out of the labour force (case e, where $L_i^* = S_i^* = 0$ for $I_i \geq \hat{I}_i(w_i)$), whereas, individuals with smaller resource endowments all engage solely in wage employment (case f, where $L_i^* > 0, S_i^* = 0$ for $I_i \leq \hat{I}_i(w_i)$).

Even this highly stylized model delivers a rich set of predictions on the extensive and intensive margins of occupation choice at baseline. As is empirically validated below, in the cross section at baseline we do observe a wide range of occupational choice allocations among the poor, ranging from those engaged solely in wage labour or entrepreneurial self-employment, those engaged in both, and those out of the labour force. Figures 1A and 1B also highlights the comparative static properties of the wage and self employment labour supply functions with respect to wage rates, returns to individual skills, and resource endowments: these last two channels provide the mechanism through which the TUP programme impacts occupational choices, as we now document.

2.3 The impact of the ultra-poor programme on occupational choices

The TUP programme has two components. First, livestock asset transfers, that boost resource endowments from I_{i0} at baseline, to $I_{i1} = I_{i0} + A$ post-intervention. A represents, in reduced form, the present value of the asset, factoring in the future option value from selling or renting it out. Second, skills

[9] Individuals specialize in one of the two occupations when the asset constraint does not bind because the marginal returns to both activities are linear. The same result would be obtained if the marginal return to one or both occupations were increasing. Of course, there can be many other motives for diversification of economic activities, such as spreading risk, that can also help to explain our data. We focus on assets constraints as being an important driver of occupational choice as this is one margin directly impacted by the TUP programme. Other factors driving occupational diversification such as risk aversion are not impacted by the programme and so are less relevant for understanding the *changes over time* that we exploit between treatment and control communities to identify the programme impacts. We return to this issue below.

training, that boost the returns to self-employment, θ_i, and hence r_i from some baseline level, r_{i0}, to a post-intervention level $r_{i1} > r_{i0}$.[10]

As Figure 1A makes clear, the asset transfer will impact the extensive and intensive margins of occupational choice by causing individuals to cross the various resource thresholds $(\tilde{I}_i(r_i), \tilde{\tilde{I}}_i(r_i), \tilde{\tilde{\tilde{I}}}_i(r_i, w))$, all else equal. Figure 2A shows graphically the impact of the programme *solely* though the asset transfer channel (assuming $r_i > w$), where the baseline wage and self-employment labour supplies are dashed lines, and the post-intervention labour supplies are solid lines. The left side of Figure 2A shows that among individuals with the smallest resource endowments at baseline, they remain engaged in both wage and self-employment activities although their time allocation shifts towards self-employment. The impact on the total hours they devote to non-leisure activities, $L_i^*(.) + S_i^*(.)$, is ambiguous.

The middle of Figure 2A shows that among individuals that were initially engaged solely in self-employment, labour hours might rise or fall depending on the initial resource endowment of the individual. Among those that were assets constrained at baseline, self-employment hours are likely to rise, all else equal. However, the framework makes clear that among those that were unconstrained at baseline, the asset transfer will actually *reduce* their hours of self-employment (and total hours devoted to labour market activities) because of the dominant income effect caused by the asset transfer. Finally, the right hand side of Figure 2A shows that asset transfers alone cause more households to drop out of both wage labour and self-employment altogether.[11]

The skills provision component of the programme also shifts the wage and self-employment labour supply functions ($L_i^*(.), S_i^*(.)$). Figure 2B shows graphically the impact of the programme solely though the skills provision channel (assuming $r_i > w$), where the baseline wage and self employment labour supplies are dashed lines, and the post-intervention labour supplies are solid lines. Figure 2B shows that among individuals initially engaged in self-employment, self-employment hours do not change unless the household was unconstrained at baseline. The left hand side of Figure 2B shows that among those individuals with the lowest resource endowments, skills provision does not cause the hours devoted to self-employment to change, although individuals find it optimal to reduce wage labour hours because of the increased returns generated when they engage in self-employment. For these individuals total non-leisure hours unambiguously fall.

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[10] Three points are of note. First, in a dynamic model, individuals might want to retain the asset in the short run if, for instance, selling it quickly would damage their relationship with BRAC. This however would not preclude them from renting it out or hiring labour to tend to it, which would have the same effect on I_i and occupational choice. We later provide evidence that almost no households are observed renting out these assets. Second, we note also that the asset transfer to women can affect I_i through other channels operating within households, for instance by affecting husbands' labour supply. The predictions below are derived for the case in which the net effect on I_i is positive, namely the asset transfer does not reduce the total non-labour income available to the woman. In line with this, we empirically document that the husbands' labour supply does not decrease following the implementation of the programme. Third, the programme transfers assets (livestock) that are identical to those available locally at baseline. Given that only a relatively small number of households per community are eligible, the programme has little impact on the price of livestock assets, p_k. Hence, skill changes induced by the programme translate into changes in self-employment outcome $r_i = p_y \theta_i - p_k$ if the price of livestock produce, p_y, does not fall by a sufficiently large extent to offset any increase in θ_i.

[11] Banerjee *et al.* (2010) develop an occupational choice model to understand the impacts of microfinance. Their framework also highlights the impacts of easing credit constraints are heterogeneous depending on occupational activities at baseline, and they also emphasize the impacts will vary according to borrower's time preferences.

Figure 2A. Impact of the asset transfer component of the programme $r_i > w$

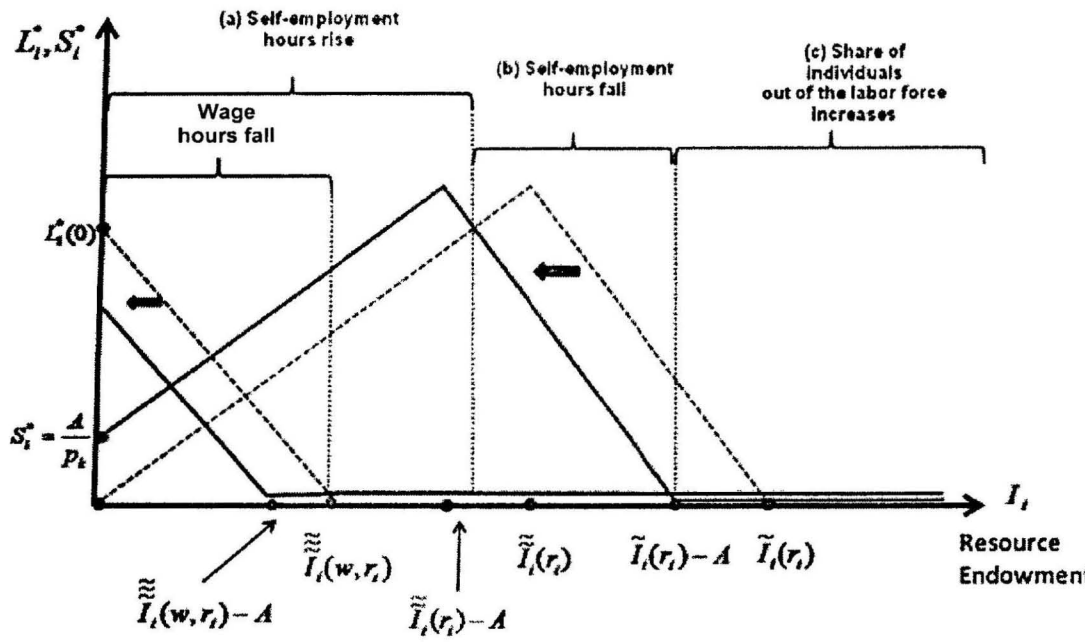


Figure 2B. Impact of the training component of the programme: $r_i > w$

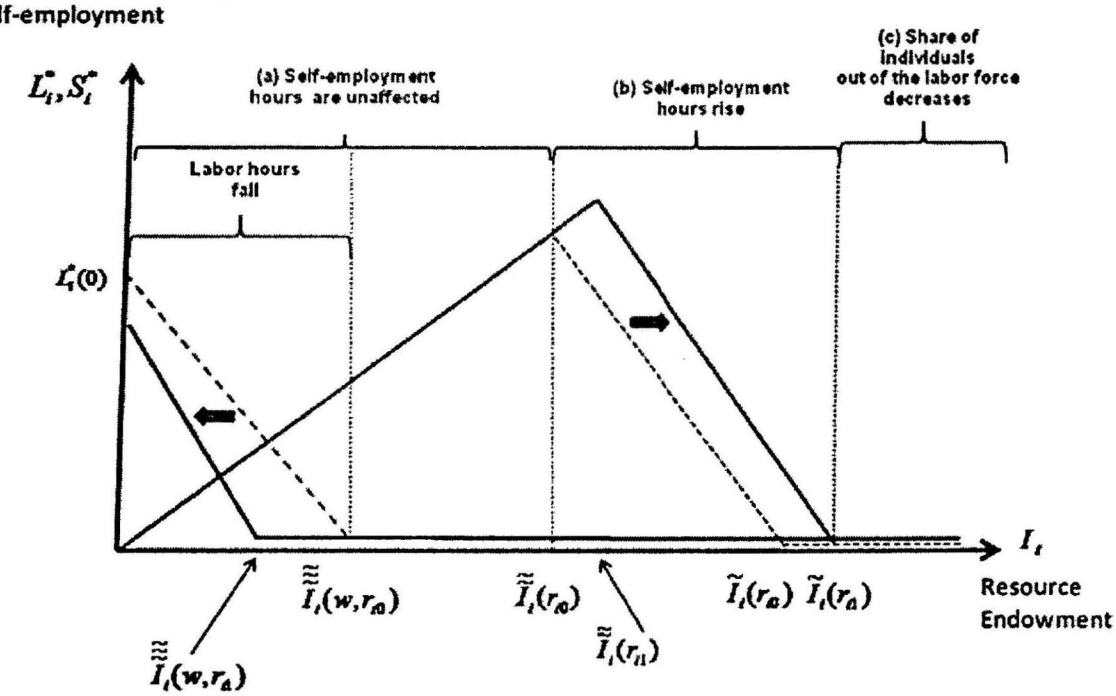
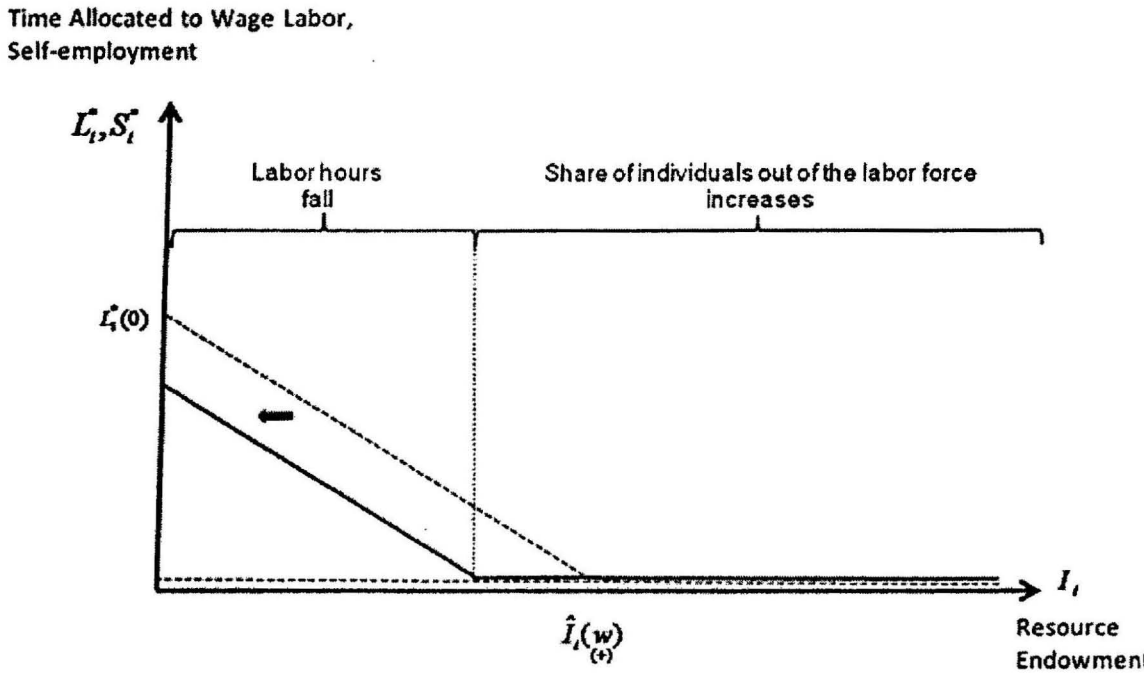


Figure 2C. Impact of the asset transfer component of the programme: $r_i < w$



Overall, the framework makes precise that both channels the TUP programme operates through: asset transfers and skills provision, need to be carefully targeted in order to have their desired impact on self-employment activities. On the extensive margin, only skills provision will likely induce individuals with higher resource endowments to start engaging in self-employment, as shown on the right hand side of Figure 2B; asset transfers will have the opposite impact as shown on the right hand side of Figure 2A. On the intensive margin, asset transfers have the desired impact to increase $S_i^*(.)$ only among those households which are constrained at baseline; skills provision has this desired impact on the intensive margin but only among those households unconstrained at baseline. The combined effect of the asset transfer and skills training on occupational choices then depends on an individual's initial resource endowment and the relative strength of the two effects summarized in Figures 2A and 2B.

Proposition 2: If $r_i > w$ the TUP programme weakly reduces wage employment hours for all individuals. The effect on self-employment hours is: (i) weakly negative for all individuals if the effect of the asset transfer is sufficiently large relative to the effect of the skills provision; (ii) weakly positive for all individuals the effect of the asset transfer is sufficiently small relative to the effect of skills provision; (iii) positive for resource-poor individuals and ambiguous for resource-rich individuals in intermediate cases.

The proof is provided in the Appendix A, where we explicitly compute the thresholds for cases (i)-(iii) as a function of the strength of the two programme components. The importance of accurately targeting the programme to achieve its desired impacts is put sharply into focus if we consider the remaining case where when $r_i < w$, as shown in Figure 2C. None of these individuals optimally chooses to specialize in self-employment at baseline. The provision of skills does not alter this as long as the post-intervention returns to self-employment, r_{i1}, remain less than w. Hence, only sufficiently effective skills provision programmes will have the desired impact of shifting these wage labourers into self-employment. Asset transfers targeted towards these individuals will have pure income effects: they will cause fewer households to optimally engage in wage employment on the extensive margin, and on the intensive

margin hours supplied to wage labour fall. Such households cannot be induced to undertake entrepreneurial self-employment activities through asset transfers alone, unless the skills provision component of the programme is sufficiently effective in raising the returns to such self-employment.[12]

The remainder of the paper focuses on empirically measuring these combined impacts of the TUP programme on the extensive and intensive margins of wage employment and self-employment in such small-scale entrepreneurial activities.

[12] As mentioned earlier, Murdoch *et al.* (2012) find weak impacts of a TUP-style programme implemented by SKS in Andhra Pradesh, also evaluated using an RCT. The model developed provides one way in which to reconcile these findings and help understand why the impacts of otherwise similarly implemented programmes might differ across economic environments. Specifically, if the environment is characterized by high labour wages so that $r_i < w$, then as shown in Figure 2C, a TUP-style programme will have limited impact on occupational choices. Indeed, in the study setting for Murdoch *et al.* (2012), the Government of Andhra Pradesh rolled out a guaranteed-employment scheme that substantially increased wage labour earnings in the study area.

3. THE ULTRA-POOR PROGRAMME, EVALUATION DESIGN AND DATA

3.1 Programme description

The TUP programme is designed and implemented by the NGO BRAC, targeting the poorest women in rural Bangladesh. The programme aims to ease the assets and skills constraints these women face, ultimately enabling them to move them away from uncertain wage labour occupations, such as day labouring in agriculture, towards higher more settled income streams stemming from their engagement in basic entrepreneurial activities.

Programme targeting proceeds in three stages. First, BRAC central office selects the most vulnerable districts in rural Bangladesh based on the food security maps of the World Food Programme. Second, BRAC employees from local branch offices within those districts select the poorest communities in their branch. Communities are self-contained within-village clusters of 80-120 households (the average cluster in our sample contains 84 households). Third, programme officers use a participatory wealth ranking that aggregates the private information of communities to classify households into wealth classes (Alatas *et al.* 2012).[13] Through this community led appraisal, all households are assigned to one of five wealth bins. The households assigned to the two lowest bins by the community (designated as the ultra poor and the near poor) are then visited by BRAC officers to determine whether the leading woman in the household meets the programme eligibility criteria.

These criteria exclude microfinance borrowers and favours women who are sole earners in the household, own no productive assets, and work in occupations outside the home.[14] Eligible women therefore represent the very poorest individuals and households from the poorest communities in the most vulnerable districts in rural Bangladesh. The ability of development programmes to fundamentally change the occupational choices of such households remains largely unproven. The evaluation of the TUP programme provides an opportunity to understand whether interventions providing livestock assets and skills provision enable a permanent transformation in the occupational choices of the poorest towards basic entrepreneurship.

BRAC then offers eligible women a menu of small-scale entrepreneurial activities they could engage in: each offer combines a specific asset transfer with the provision of the skills most relevant to that particular activity. The menu includes livestock rearing options, as well as the offer to set up small retail outlets, or engage in the production of small crafts such as basket weaving. All eligibles in our evaluation sample chose livestock-based entrepreneurial occupations. As documented below, such activities are typically operated by middle and upper class women in the same communities (as defined through the participatory wealth ranking). Hence the conformity of choice towards such occupations in part likely reflects the status associated with such activities, that inputs and knowledge relate to such activities is

[13] In a randomized evaluation of different targeting methods, Alatas *et al.* (2011) show that, compared to proxy means tests, community appraisal methods resulted in higher satisfaction and greater legitimacy. Their distinctive characteristic was that community methods put a larger weight on earnings potential.

[14] There are three exclusion criteria for households, all of which are binding: (i) already borrowing from an NGO providing microfinance, (ii) receiving assistance from government anti-poverty programmes, (iii) having no adult women present. Furthermore, to be selected a household has to satisfy three of the following five inclusion criteria: (i) total land owned including homestead land does not exceed 10 decimals; (ii) there is no adult male income earner in the household; (iii) the household is dependent upon female member(s) work outside the homestead; (iv) school-aged children have to work; and (v) the household has no productive assets.

available from within communities, and that produce output markets for milk, meat and eggs have relatively stable demand over time and so are not viewed as inherently risky activities.[15]

Given these choices, the programme transfers live animals to each eligible woman in the form of cows, goats or chickens, and provides intense and long-term training and support the women in how to rear these livestock and maximize their productivity. Beneficiaries could choose between 6 different livestock packages containing either one or two animal types (e.g. only cows or a cow and five goats), and all packages were on average of similar value at Tk. 9500 (USD 140). Given that the median household had no productive assets at baseline, this represents an enormous change in the resource endowment of households, as modeled in the theory and the implications of which for occupational choice have been shown in Figure 2A.

BRAC encourages programme recipients to commit to retain the asset for two years, although they are permitted to sell or exchange it for another income generating asset within that period. After two years, beneficiaries are under no obligation to retain the livestock asset. In practice, however, the commitment to retain the asset for two years is unenforceable. Thus, whether the livestock asset is retained or liquidated is itself an outcome of interest that ultimately determines whether the programme has the desired effect to permanently transform the occupational choices and economic lives of the poor, or merely increases their short run welfare.[16] As highlighted in Figure 2A, the pure wealth effect of asset transfers can induce some households to exit self-employment altogether. As our evaluation tracks eligible households two and four years after the programme's initiation, we later chart household asset accumulation over time.

The second component of the TUP programme is the provision of skills complementary to the transferred livestock asset. This component comprises initial classroom training at BRAC regional headquarters, followed up by regular assistance thereafter: a specialist in the livestock asset visits beneficiaries every one to two months for the first year of the programme, and BRAC programme officers visit beneficiaries weekly for the first two years. Hence, relative to many skills provision programmes, this is an intense and long-lasting transfer of skills. The skills imparted are designed to aid women to maintain livestock health; maximize the productivity of livestock through best practices relating to providing animals food and water, as well as other inputs such as feed; learning how to best inseminate animals to produce offspring and milk; to rear calves; how to bring their produce to market. In reduced form, we capture all these programme channels as impacting behavior through an increase in the returns to self-employment, the implications of which are shown in Figure 2B.

As the programme is designed to induce occupational change among women, the programme provides a subsistence allowance to beneficiary women until they are able to generate earnings from the asset. In our sample, beneficiary households received allowance for the first 40 weeks after the livestock asset transfer. This compensates women for any short-run fall in earnings due to occupational changes away from wage labour and into self-employment. This 40-week period is such that by the end of it, beneficiary women should have learned to manage their livestock assets well enough through various environmental and market conditions, so that this form of basic entrepreneurship begins to generate a regular earnings flow. This allowance runs out fifteen months before the beginning of our first follow-up survey and is therefore not part of the earnings measures reported below.

3.2 Evaluation strategy

We evaluate the TUP programme using a randomized control trial, during the phase when the programme is being rolled out across rural Bangladesh by BRAC. For the evaluation sample, we first

[15] Murdoch *et al.* (2012) report that when a TUP-style programme is offered to the rural poor in Andhra Pradesh, almost 90% of households opt for livestock related asset transfers from the wide ranging menu offered.

[16] Indeed, Murdoch *et al.* (2012) document that in the Andhra Pradesh setting, households took up the offer of a TUP-style programme, but many immediately liquidated the assets in order to pay off debts.

randomly select one or two sub-districts (*upazilas*) from each district. Within sub-districts, there are typically multiple BRAC branch offices, with each office being responsible for the provision of BRAC services to communities in its area.[17] To reduce unobserved heterogeneity between treatment and control units, we stratify the randomization by sub-district. The average sub-district has an area of approximately 250 square kilometers (97 square miles). Communities within the same sub-district are subject to the same local governance structures, and experience similar local policies. Within subdistrict, randomization then occurs at the branch office where we randomly assign one office to treatment and one to control. We use branches rather than communities as the unit of randomization to minimize the risk of contamination between treatment and control units, both because communities within the same branch office are geographically closer to each other, and because this minimizes the risk that programme officers, who are based at a specific branch office, do not comply with the randomization.

As described above, within each branch, the poorest communities are identified. The evaluation sample then covers the poorest 1409 communities from within 40 branch office jurisdictions in 20 sub-districts: the randomization design implies that communities within the 20 treated branches begin receiving the TUP programme in 2007, and communities within the 20 control branches are kept as controls until 2011.

Two features of the research design are of note. First, the process to identify the poorest households in communities was conducted in both treatment and control communities. In each community, eligible households are identified using a participatory wealth ranking method that aggregates the private information of communities, followed up by BRAC officers verifying the eligibility of the households identified to be in the lowest wealth classes. As BRAC already operates in all communities in the evaluation sample, the participatory wealth ranking exercise is justified as part of BRAC's regular activities. BRAC had no other programmes targeted to TUP eligible households in treatment or control locations, nor is participation to the TUP programme conditional on joining other BRAC activities. We therefore estimate the causal impact of the TUP programme by comparing the outcomes of eligibles in treated communities to those of eligible households in control communities before and after the TUP programme introduction. This method differences out baseline differences in outcomes between treatment and control communities and common underlying time trends. Eligible households in control communities serve as valid counterfactuals under the twin identifying assumptions of random assignment and there being no spillover effects from treatment to control locations, as discussed below.

Second, to ensure our estimates are not contaminated by anticipation effects, women identified to be eligible at baseline but residing in control communities are neither informed of their eligibility status, nor told that they will be treated at some future date. Eligible's in control communities are informed of the programme after the end line survey is completed.

3.3 Data collection

In each treatment and control community we survey all households for which an eligible woman has been identified. Although our baseline results focus on the mean impacts of the TUP programme, by collecting an effective census panel of eligible households, we are able to later provide precise evidence from quantile treatment effect estimates on how heterogeneous the programme impacts are within eligible's. In each community we also survey a 10% random sample of households from all other wealth classes. For expositional ease, we define households to be in one of four wealth classes: the targeted poor (i.e. those eligible for the TUP programme), the near-poor, the middle class, and the upper class. As the assignment of households to these classes is based on the community wealth ranking exercise, these definitions obviously refer to relative poverty. Our baseline survey is fielded in 2007 and we

[17] For each district located in the poorer Northern region we randomly select two subdistricts, and for each district located in the rest of the country we randomly select one subdistrict, restricting the draw to subdistricts containing more than one BRAC branch office. For the one district (Kishoreganj) that did not have subdistricts with more than one BRAC branch offices, we randomly choose one treatment and one control branch without stratifying by subdistrict.

construct a panel by tracking households for four years. The midline and end line surveys are conducted in 2009 and 2011, enabling us to trace out the short and longer term programme impacts, that are especially important for a programme aiming to shift the extensive margin of occupational choice.

By tracking outcomes for households across the wealth distribution in each community, our research design corresponds to a partial population experiment (Moffitt 2001). We exploit this in two broad ways. First, later in this paper we use this data to benchmark the magnitude of the programme impacts relative to the initial gap at baseline in the same outcome between targeted poor households and middle class households. This provides a clear picture of how transformative the TUP programme is in this setting, and has important implications for the distributional impacts the programme has on these poor communities.

Second, in ongoing work we exploit the data on non-eligible households from the same communities to shed light on whether there are general equilibrium impacts of the programme operating through markets for wage labour and livestock produce for example. This builds on a growing literature examining indirect treatment effects on non-eligibles of various policy interventions in village economies (Miguel and Kremer 2004, Angelucci and De Giorgi 2009).

The survey questionnaire collects particularly detailed information on all income generating activities each individual in the household is engaged in during the previous year. This information is collected from the main female and main male in each household. For each economic activity, we ask whether the individual was self-employed or hired by a third party, the number of hours worked per day, the number of days worked during the previous year, wage rates, total earnings, and whether earnings varied throughout the year. From this data we build a complete picture of each individual's occupational choice, labour supply, labour income, and volatility of income by economic activity, where nearly all activities among eligible households can be classified as being a form of wage labour (L_i) or self-employment (S_i). This allows us to estimate whether the programme had impacts of transforming the economic lives of the poor through changes on the extensive and intensive margins of occupational choice as emphasized in the model. As such data is collected on each household member (not just the eligible women), we later check whether and how other household members adjust their occupational choices in response to the asset transfer and skills provision to the vulnerable female in the family.

At baseline, our evaluation sample surveys 7953 eligible households in 1409 communities in 40 BRAC branches, and an additional 19,012 households from all other wealth classes. Over the four years from baseline to end line, there is a 13% of attrition rate among eligible households.[18] Table B1 (Appendix B) estimates the probability of not attriting as a function of treatment status and baseline occupational choice, which is the main outcome of interest. Three findings are of note. First, attrition rates are the same in treatment and control communities, as shown in Column 1: the coefficient on the treatment status indicator is close to zero and precisely estimated. Second, attrition is correlated to occupational choice at baseline, in particular women engaged in self-employment activities (either exclusively or in conjunction with wage labour) are 6pp more likely to be surveyed in all three waves compared to women who were out of the labour force at baseline. Women engaged solely in wage labour are equally likely to attrit. Third, and most important, there is no differential selection by treatment, namely the coefficients of the interaction terms between treatment status and occupational choice are all precisely estimated and close to zero. This suggests that the programme does not affect the probability that respondents drop out of the sample, possibly due to migration, neither on average, nor by occupational choice. As some of the models below are estimated in first differences, to ease comparability we restrict the sample to households that appear in all three waves throughout. The

[18] This attrition rate is comparable to those in other evaluations of TUP-style programmes: Banerjee *et al.* (2011) find that of 978 households surveyed at baseline in West Bengal, 17% attrit over an 18-month period (predominantly due to refusal to sit the end line survey). Murdoch *et al.* (2012) find that of 1064 households surveyed at baseline in Andhra Pradesh, 12% attrit over a three year period.

working sample thus contains 6732 eligible beneficiaries households and 16,297 households from other wealth classes.

3.4 Identification

To evaluate the effect of the TUP programme on the eligible poor women, we estimate the following difference in difference specification,

$$y_{idt} = \alpha + \sum_{t=1}^{2} \beta_t W_t T_{id} + \gamma T_i + \sum_{t=1}^{2} \delta_t W_t + \eta_d + \varepsilon_{idt}, \qquad (2)$$

where y_{idt} is the outcome of interest for individual i in subdistrict d at time t, where the time periods refer to the baseline ($t = 0$), midline ($t = 1$) and end line ($t = 2$) survey waves. $T_{id} = 1$ if individual i lives in a treated community and 0 otherwise, W_1 and W_2 are indicators for the midline and end line survey waves. η_d are subdistrict fixed effects and are included to improve efficiency because the randomization is stratified by subdistrict (Bruhn and McKenzie 2009). We estimate (2) on the entire sample of eligible women, so that β_t identifies the intent to treat parameter between baseline and survey wave t. In our setting this is the close to the average treatment on the treated effect as 87% of selected eligibles take-up the offer to receive assets and complementary training.

The programme impact, β_t is thus identified by comparing changes in individual outcomes among eligibles before and after the programme in treatment communities, to changes among eligibles in control communities within the same subdistrict. We thus control for all time-varying factors common to individuals in treatment and control communities, and for all time-invariant heterogeneity within subdistrict. β_t identifies the causal effect of the programme under the twin assumptions of random assignment (so that underlying trends in the outcomes of interest are the same for individuals in treatment and control communities within subdistrict), and that there are no spillover effects across treatment and control communities (so that outcomes depend only on own treatment assignment). On the first assumption, we provide evidence on the sample balance across treatment and controls in the next Section. On the second assumption, as discussed above, treatment is randomized at the level of the BRAC branch office to minimize the risk of contamination among communities served by the same office. Indeed, the average distance between a treatment and a control branch office is 12 kilometers.

Standard errors are clustered at the community level throughout to account for the fact that outcomes are likely to be correlated within community. Results are generally robust to clustering by BRAC branch office area but this is less appropriate than community level clustering because the geographical coverage of a single office reflects BRAC's capacity rather than any underlying feature of the economic environment common to all communities in the area.

4. MAIN RESULTS

4.1 Economic lives at baseline

Table 1 presents descriptive evidence on how the characteristics of eligible women and their households compare to other wealth classes at baseline. This shows the eligible poor to be severely disadvantaged relative even to the near-poor, never mind those ranked by communities as middle or upper class. Panel A focuses on household characteristics: eligible poor households are more likely to have a woman as the sole earner. Only 7% of eligible women are literate, and this almost doubles among near-poor households. The other Columns in Table 1 highlight how poor these communities are and that the wealth ranking is a relative measure of poverty: even among those households classified as upper class, the majority of primary women in the household are illiterate. The asset holdings of eligible households, whether in livestock or land, are negligible and their per capita expenditure lies below that of near-poor, middle and upper class households. Based on all these metrics, the TUP programme does appear to successfully target the very poorest women (and their households) in these rural communities.[19]

Panel B of Table 1 focuses on the occupational choices of the primary women in each household, by wealth class. To map to the occupational choice model developed, we group all activities where the individual is employed by another party as "wage employment" and activities where the individual runs her own business as "self-employment". Within wage employment, the two most frequent occupations are casual agricultural labourer and domestic servant (maids).[20] Within self-employment occupations, most individuals are engaged in livestock rearing and land cultivation.[21] We multiply hours worked in a typical day by the number of days worked and sum within each employment type to measure the total hours devoted to each during the last year. Eligible women engage in 2.3 income generating activities over the year prior to the baseline survey. We use annual data as several of these activities, especially casual labour in agriculture, exhibit strong seasonality.

[19] This is in contrast to many antipoverty government policies and some microfinance programmes that have been found to mistarget the poorest households or be unable to retain them (Murdoch 1998, Dreze and Khera 2010). In our context, the fact that at baseline the average targeted poor own no livestock assets suggests they also lack skills in how best to rear livestock and maximize their productivity. Our evaluation then helps to measure whether such skills can be imparted to these individuals.

[20] No other occupations apart from agricultural day labourer or domestic servant have more than 5% of eligible female respondents in them. 38% of eligible women engage solely as agricultural wage labourers, 43% work solely as maids, and 10% do both. Of those working for daily wage spot contracts, 87% do so in agriculture. Among maids, two factors point to these activities as not being stable forms of employment: (i) the median number of days worked per year on maid activities is 180, that is well below full employment; (ii) 86% of eligible women whose main occupation is maid work (defined as that accounting for most hours worked), report not having stable earnings from that occupation, rather they report their earnings varying by month.

[21] Of those eligible women specialized in self-employment activities at baseline, 82% report engaging in some animal husbandry, with 8% being tailors and the remaining 10% split across other activities. Among those engaged in animal husbandry at baseline, 13% have one or more cows, 19% have one or more goats, and 81% one or more chickens so that nearly all livestock related self-employment activities at baseline are small-scale poultry rearing.

Table 1. Economic lives at baseline in treatment communities, by wealth class

Means, standard deviation in parentheses

	(1) Eligible poor	(2) Near poor	(3) Middle class	(4) Upper class
A. Household characteristics				
Primary female is the sole earner (yes=1)	.378	.275	.139	.111
	(.485)	(.446)	(.345)	(.315)
Primary female is literate (yes=1)	.073	.157	.260	.488
	(.260)	(.260)	(.439)	(.500)
Household owns livestock (yes=1)	.485	.602	.840	.958
	(.499)	(.489)	(.366)	(.201)
Value of livestock owned (Takas)	940.308	2832.57	13021.8	30597.36
	(3431.704)	(7052.423)	(30623.8)	(34342.5)
Total per capita expenditures (Takas)	9921.14	10206.39	12077.88	19879.05
	(4411.01)	(4870.37)	(6701.93)	(15086.77)
B. Occupational choices of primary women				
Specialized in wage employment (yes=1)	.257	.142	.024	.003
	(.437)	(.349)	(.155)	(.053)
Specialized in self-employment (yes=1)	.303	.435	.748	.861
	(.459)	(.495)	(.434)	(.346)
Engaged in both wage and self-employment (yes=1)	.264	.213	.081	.016
	(.441)	(.409)	(.273)	(.125)
Hours devoted to wage employment	646.762	397.19	113.53	30.39
	(805.548)	(671.37)	(392.85)	(245.65)
Hours devoted to self-employment	421.817	484.65	718.17	797.75
	(590.855)	(575.18)	(563.14)	(514.67)
Share of income generating activities held regularly	.478	.587	.804	.907
	(.422)	(.415)	(.334)	(.241)
Share of income generating activities with seasonal earnings	.674	.593	.564	.563
	(.397)	(.411)	(.413)	(.413)
Earnings per hour (Takas)	4.08	4.01	4.79	7.98
	(4.24)	(5.30)	(8.04)	(12.38)
Number of households	4045	3168	3398	1067

Notes: All data refers to the baseline survey. The eligible poor are the potential beneficiaries of the programme (the women and their households). The near poor are non-eligible households that were ranked in the bottom two wealth bins (four and five) during the participatory rural assessment (PRA) exercise. Middle class households are those that were ranked in wealth bins two and three during the PRA. Upper class households are those ranked in wealth bin one during the PRA. Panel A refers to household characteristics and Panel B refers to characteristics of the lead woman in each household. Total per capita expenditures equals expenditure over the previous year divided by adult equivalents in the household. The adult equivalence scale gives weight 0.5 to each child younger than 10. All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.

Column 1 of Panel B shows that eligible women are evenly distributed among the three occupational choice categories described in Proposition 1: 26% are specialized in wage employment, 30% in self-employment and 26% are engaged in both types of activities. The model provides one way to map these observations back to the underlying constraints individuals face. Doing so suggests that 26% of eligible women engage solely in wage labour because, either: (i) they are relatively skilled in self-employment but face such binding asset constraints they are prevented them from engaging in any self-employment (Figure 1A, $r_i > w$, $I_i = 0$); (ii) or for them the wage rate is higher than the returns to self-employment (Figure 1B, $r_i < w$, $I_i \geq 0$). Among the 30% solely engaged in self-employment, the returns from self-

employment are sufficiently high and *some* fraction will face binding assets constraints (Figure 1A, $r_i > w$, $I_i \in [\tilde{\tilde{I}}_i(r_i, w), \tilde{I}_i(r_i))$). Among the 26% engaged in both occupational types, their returns from self-employment are sufficiently high and *all* face binding assets constraints (Figure 1A, $r_i > w$, $I_i \in [0, \tilde{\tilde{I}}_i(r_i, w))$.[22]

The baseline data are also consistent with the wealth ordering across occupational choices implied by the model. Proxying resource endowments by household wealth (excluding land and livestock that are mechanically correlated with self-employment), such endowments are valued at Tk. 1319 for those solely engaged in wage employment, Tk. 2995 for those engaged in both wage and self employment activities, and Tk. 4050 for individuals solely engaged in self-employment. All differences are precisely estimated at conventional levels.

On the intensive margin of occupational choice, Panel B of Table 1 shows that eligible women devote 50% more hours to wage activities compared to self-employment activities. Among eligible's, just under half of these activities (48%) are held regularly throughout the year. The average wage employment activity is undertaken for 77 days per year and 7.4 hours per day, while the average self-employment activity is undertaken for 145 days and 1.96 hours per day. This naturally leads eligible women to have seasonal earnings: indeed two thirds of income generating activities exhibit earnings seasonality. Indeed, it is well documented that landless agricultural labourers, such as the eligible women here, are exposed to seasonal hunger and famine - monga - as it is referred to Bangladeshi (Bryan *et al.* 2011; Khandker and Mahmud 2012). Monga is the result of limited demand for agricultural labour in the pre-harvest period.

Relative to other women in these communities, targeted poor women are far more reliant on wage employment as opposed to self-employment, and have far more seasonal earnings. Looking across the Columns of Panel B of Table 1 it is clear that in these communities wage employment goes hand in hand with poverty. Middle and upper class women do not labour for others but rather devote effort to self-employment. The difference emerges both on the extensive and intensive margins: 52% of eligible women work for a wage, while the share falls to 35%, 10%, and 2% for near-poor, middle and upper class women, respectively. This also implies that eligible poor, and to a lesser extent near poor, women are often engaged both in self-employment and wage employment (26% and 21% report both activities) while middle and upper class women specialize in self-employment.

Table 2 compares eligible women resident in treatment and control communities. For each variable we report both the difference (Column 3) and the normalized difference of means (Column 4), computed as the difference in means divided by the square root of the sum of the variances. This is a scale-free measure and, contrary to the p-value for the null hypothesis of equal means, does not increase mechanically with sample size. The results show that eligible women in treated and control communities are similar on observables, as expected with communities being randomly assigned to treatment and control status. Column 4 shows that all normalized differences are smaller than 1/6th of the combined sample variation, suggesting that the randomization yields a balanced sample, on average. Imbens and Wooldridge (2009) suggest, as a rule of thumb, if normalized differences are below .25, linear regression methods are not likely to be sensitive to specification changes.

[22] When mapping this variation in baseline activities to the modeling framework, the relevant rates of return to wage and self-employment (w and r_i) are the product of the relevant rate conditional on that occupational type being available, and the proportion of days in the year that such occupational choices are available.

Table 2. The economic lives of eligible women at baseline, by treatment status

Columns 1 and 2: Means and standard deviation in parentheses
Column 3: Difference in means and standard errors in parentheses, clustered by community
Column 4: Normalised difference of means

	(1) Treated communities	(2) Control communities	(3) Raw differences	(4) Normalised differences
A. Household characteristics				
Primary female is the sole earner (yes=1)	.378	.455	-0.077***	-.111
	(.485)	(.498)	(.015)	
Primary female is literate (yes=1)	.073	.067	.006	.017
	(.260)	(.250)	(.007)	
Household owns livestock (yes=1)	.485	.465	.020	.028
	(.499)	(.498)	(.017)	
Value of livestock owned (Takas)	940.308	881.115	59.19	.012
	(3431.704)	(3325.976)	(109.03)	
Total per capita expenditures (Takas)	9921.14	9687.54	233.59	.036
	(4411.01)	(4677.66)	(145.58)	
B. Individual occupational choice				
Specialized in wage employment (yes=1)	.257	.306	-.049**	-.077
	(.437)	(.461)	(.014)	
Specialized in self-employment (yes=1)	.303	.292	.011	.016
	(.459)	(.455)	(.015)	
Engaged in both wage and self-employment (yes=1)	.264	.272	-.008	-.012
	(.441)	(.445)	(.015)	
Hours devoted to wage employment	646.762	810.360	-163.6***	-.137
	(805.548)	(886.669)	(29.87)	
Hours devoted to self-employment	421.817	422.911	-1.09	-.001
	(590.855)	(592.103)	(18.44)	
Share of income generating activities held regularly	.478	.458	.019	.033
	(.421)	(.420)	(.016)	
Share of income generating activities with seasonal earnings	.674	.663	.011	.021
	(.397)	(.397)	(.016)	
Earnings per hour	4.08	4.20	-.117	-.020
	(4.24)	(3.95)	(.144)	
Number of households	4045	2687		

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. All data refers to the baseline survey. Columns 1 and 2 report statistics based on eligible in treatment and control communities respectively. Column 3 reports the difference in means and its standard error clustered at the community level. Column 4 reports normalized differences computed as the difference in means in treatment and control communities divided by the square root of the sum of the variances. Panel A refers to household characteristics and Panel B refers to characteristics of the lead woman in each household. Total per capita expenditures equals expenditure over the previous year (on food and non-food items) divided by adult equivalents in the household. The adult equivalence scale gives weight 0.5 to each child younger than 10. All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.

The one difference of note is in the share of women who are sole earners in the household, and this is associated with the fact that women in control communities work more hours in wage employment. While these differences are precisely estimated, they are small relative to the sample variation as shown by the normalized differences. In this regard, it is important to note that the difference in difference specification described in Section 3.4 above fully accounts for differences in levels between treatment and control communities. To ensure that our estimated programme effects are not contaminated by the fact that the occupational choice of sole earners follows a different trend, the Appendix Table B2 reports estimates of (2) for all our baseline outcomes, augmented by the interaction of survey waves with a dummy variable for the eligible woman being a sole earner. To probe the robustness of our findings against the concern that eligible beneficiaries in control communities might be an imperfect counterfactual for the poor in treatment communities we repeat the analysis using the entire sample (6895) of poor women in control communities, namely including those who the *community* ranked as poor but BRAC officials deemed ineligible for the TUP programme, as a control group. As we show below all results are robust to these alternative specifications.

4.2 Occupational choice, earnings and labour productivity

The TUP programme is, at its core, designed to promote occupational change at the bottom of the wealth distribution. This is what distinguishes it from most programmes that focus on improving skills or access to capital for poor individuals who remain in a given occupation. It asks a fundamental question: can the poorest women, who carry every disadvantage with regard to running a small business, break out of seasonal wage employment, which is the employment of last resort, and enter more secure self-employment based occupations? It is in this sense that it can be correctly described as an attempt to transform the economic lives of the poor. The core findings on whether this attempt at transformation was successful are contained in Figure 3 and Table 3.

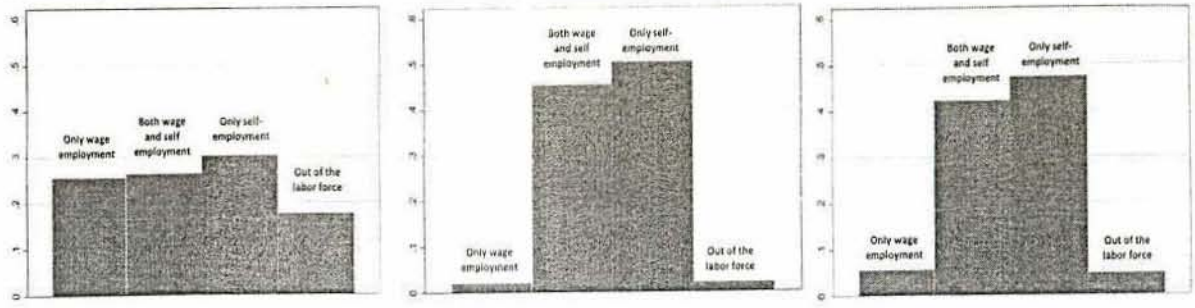
Figure 3 shows the dramatic change in the occupational structure of the eligible poor in treated communities relative to their counterparts in control communities. At baseline, the distribution across activities (wage employment only, both wage and self-employment, self-employment only, out of the labour force) was similar in treatment and control communities. Two years later, all the eligible women in treated communities were in the labour force, and almost all of them were engaged in self-employment. In sharp contrast, women in control communities experienced no noticeable change relative to baseline. Examining occupational choices four years after the programme's initiation, reveals that the significant changes in the occupational choices of the targeted poor achieved two years after programme implementation, were maintained four years after implementation. In contrast, the distribution across occupations in control communities is essentially the same across the four years suggesting the roll-out of the TUP programme does not coincide with an underlying process of change in occupational structure for the poorest women in rural Bangladesh.[23, 24]

[23] Figure 3 also provides evidence against the interpretation that risk diversification is the main determinant of occupational choice in this setting. Indeed, individuals who solely engaged in wage employment at baseline (26% of the sample) also engage in self-employment at follow-up. To be consistent with a risk diversification explanation, we would need the programme to either increase the risk aversion of these individuals, which is unlikely as individuals are wealthier after the intervention, or dramatically lower the uncertainty associated with self-employment, which is unlikely as the livestock assets transferred by the programme and their production technology was very similar to existing self-employment opportunities.

[24] This is in sharp contrast to the setting in Murdoch *et al.* (2012) who find no impacts of a TUP-style programme in Andhra Pradesh. They highlight that key to understanding this divergence in results, is that in Andhra Pradesh, stable wage labour opportunities on government programmes were dramatically improving over the study period, and the rural economy was characterized by a growing movement of labour away from self-employment opportunities into such government wage labour schemes. As such, the introduction of a TUP-style programme was very much fighting against such trends, and any gains caused by the programme were offset by lost wage labour market opportunities. As discussed earlier and in relation to Figure 2C, this is a very different scenario to what we observe in rural Bangladesh where wage labour opportunities remain uncertain and insecure.

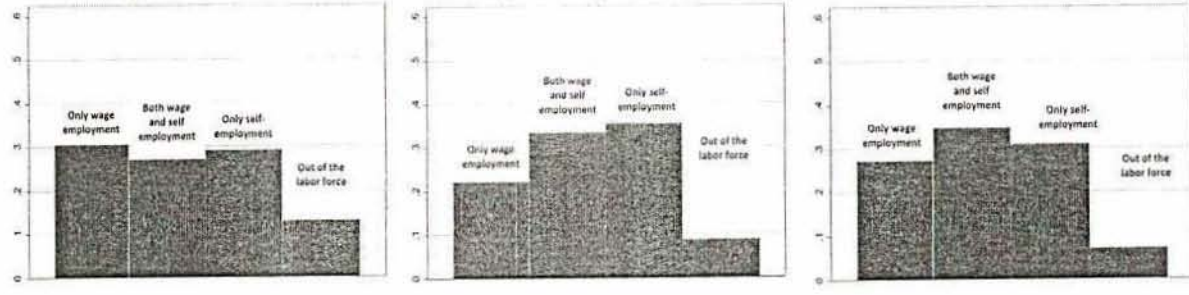
Figure 3. The extensive margin occupational choices, by treatment and control communities at baseline, midline and end line

Panel A. Treatment communities



Baseline Midline End line

Panel B. Control communities



Baseline Midline End line

Table 3. The impact of the ultra poor programme on the occupational choices and earnings of eligible women

Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Occupational choice			Seasonality and earnings					
	(1) Specialized in wage employment (yes=1)	(2) Specialized in self-employment (yes=1)	(3) Engaged in both occupations (yes=1)	(4) Hours devoted to wage employment	(5) Hours devoted to self employment	(6) Share of activities held regularly	(7) Share of activities with seasonal earnings	(8) Total annual earnings	(9) Earnings per hour
Programme effect after 2 years	-0.153***	0.139***	0.127***	-82.334***	477.670***	0.187***	-0.010	1547.712***	-0.189
	(0.02)	(0.02)	(0.02)	(27.11)	(23.93)	(0.02)	(0.02)	(249.66)	(0.19)
Programme effect after 4 years	-0.168***	0.154***	0.084***	-169.139***	388.410***	0.174***	-0.082***	1753.917***	0.641***
	(0.02)	(0.02)	(0.02)	(28.71)	(23.40)	(0.02)	(0.02)	(252.02)	(0.19)
Mean of outcome variable in treated communities at baseline	0.257	0.303	0.264	646.7	421.81	0.478	0.674	4607.7	4.14
Two year impact = Four year impact (p-value)	.217	.336	.011	.001	.000	.447	.000	.464	.000
Adjusted R-squared	0.11	0.089	0.073	0.086	0.156	0.098	0.082	0.078	0.045
Number of eligible poor women	6732	6732	6732	6732	6732	6732	6732	6732	6732
Observations (clusters)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	18672 (1308)	18672 (1308)	20196 (1309)	18387 (1308)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves and subdistrict fixed effects. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. All variables are measured on an annual basis. All outcome variables are measured at the individual level (for the eligible woman in the household). All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.

Table 4 reports the equivalent of the information in Figure 3 for all outcomes for which we estimate treatment effects. Table 4 allows to see how these outcomes change in treatment compared to control locations without conditioning on any correlates.

Table 4. Unconditional trends in treatment and control

	Baseline survey (2007)		First follow-up survey (2009)		Second follow-up survey (2011)	
	Treatment	Control	Treatment	Control	Treatment	Control
Specialised in wage employment (%)	25.70	30.60	2.00	22.20	5.50	27.30
Specialised in self-employment (%)	30.30	29.30	50.50	35.50	47.50	31.00
Engaged in both occupations (%)	26.40	27.20	45.40	33.50	42.30	34.70
Hours devoted to wage employment	646.76	810.36	443.43	689.36	506.73	839.47
Hours devoted to self employment	421.82	422.91	1,008.90	532.33	935.42	548.10
Hours devoted to income-generating activities	1,068.58	1,233.27	1,452.33	1,221.69	1,442.15	1,387.57
Share of activities held regularly	0.478	0.458	0.620	0.408	0.618	0.419
Share of activities with seasonal earnings	0.674	0.663	0.753	0.756	0.602	0.673
Earnings per hour (Tk.)	4.09	4.20	4.76	5.06	6.07	5.52
Total earnings (Tk.)	4,607.72	5,515.19	6,974.66	6,334.42	8,675.33	7,828.88
Number of cows	0.084	0.067	1.220	0.128	1.212	0.132
Number of poultry	1.786	1.780	4.148	1.988	3.108	1.460
Number of goats	0.148	0.179	0.831	0.196	0.570	0.187
Value of All Livestock (Tk.)	940.31	881.12	11,462.16	1,419.44	12,281.22	1,487.91
Rents Land For Cultivation (%)	5.90	6.10	16.40	9.80	18.50	7.90
Owns Land for Cultivation (%)	6.80	6.20	8.00	6.90	8.90	5.80
PCE Total (Tk. yearly)	9,921.14	9,687.54	9,237.58	8,298.19	10,130.54	9,065.17
PCE Non Food (Tk. yearly)	1,054.46	1,029.82	1,410.84	1,207.12	1,771.53	1,247.75
PCE Food (Tk. yearly)	8,861.04	8,658.96	7,829.95	7,081.46	8,359.69	7,820.75
Food Security	0.457	0.365	0.826	0.557	0.861	0.689
Happy (%)	40.40	31.00	54.70	42.10	54.50	38.80
Experience anxiety (%)	53.10	57.00	48.40	52.30	83.10	85.70

Notes: *Specialised in wage labour* means that the individual only engages in income generating activities where they are employed by others. *Specialised in self-employment activities* means that the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are computed as total earnings divided by total hours worked in all income generating activities. Share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. Share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. Total per capita expenditures equals expenditure over the previous year divided by adult equivalent. All occupational choice variables are defined over the previous year. The definition of *Food security* is that the household reports being able to afford two meals a day for all members on most days. The definition of *Happiness* is that the individual reports to be satisfied or very satisfied with their life overall. *Experience anxiety* means that the individual reports experiencing episodes of anxiety over the past year

Table 3 reports the ITT impact estimates of the TUP programme from specification (2), and shows the parameters of interest, β_1 and β_2, measuring the ITT impacts at midline and end line (two and four years after baseline respectively). At the foot of the table we show the p-value on the null that these coefficients are equal. This allows us to assess the dynamic responses of individuals and households along each outcome margin. As described in Section 3.1, households are no longer obliged to retain the asset two years into the programme, and the intense training provided also terminates by two years. Hence, the comparison of the two and four year programme impacts is indicative of whether the programme is self-sustaining and induces permanent changes in occupational choice, or whether individuals begin to revert back to their economic lives at baseline once the period of intense programme delivery from BRAC is over. To benchmark the magnitude of each impact, the foot of the table 3 also shows the mean of the outcome variable at baseline among treated communities. The working sample

contains 6732 eligible women, each surveyed three times over four years, for a total of 20,196 women-year observations.

We first present evidence on the programme ITT impacts on the extensive and intensive margins of occupational choice as emphasized in the modeling framework (Table 3, Columns 1-5), and then on the seasonality and earnings of occupations (Columns 6-9). On the extensive margin of occupational choice, Columns 1-3 confirm the dramatic transformation shown in Figure 3. After four years, the share of women specialized in wage employment drops by 17pp, 65% of the baseline mean. Over the same period, the share of women specialized in self-employment increases by 15pp and those engaged in both occupations by 8pp. These changes on the extensive margin of occupational choice correspond to 50% and 31% increases from their baseline values, respectively. In line with Figure 3, the effect on the extensive margin is largely stable moving from two to four years after the programme's initiation.

This dramatic change in occupational choice on the extensive margin is accompanied by a corresponding change in hours devoted to the two occupation categories, as shown in Columns 4 and 5. After four years, eligible women work 170 fewer hours in wage employment (a 26% reduction relative to baseline) and 388 more hours in self-employment (a 92% increase relative to baseline). The comparison of the two and four year effects reveals an interesting pattern: the reduction of wage employment hours is twice as large after four years than after two (p-value .001), suggesting the long run elasticity of the labour supply of wage employment with respect to asset transfers and skills provision, is higher than the short run responsiveness. One interpretation is that eligible women hold onto some of their wage employment activities until their livestock businesses are well-established. In contrast, the increase in self-employment hours is larger after two years than after four (p-value .000), possibly because between two and four years targeted women became more efficient in production as they gain experience in livestock rearing.[25,26]

In both years the increase in self-employment hours is larger than the fall in wage employment hours, so that total labour supply, $L_i^*(.) + S_i^*(.)$, increases throughout. After four years targeted women work an additional 218 hours, a 19% increase relative to baseline. As Figures 2A and 2B make clear, there is no *ex ante* reason for aggregate labour supply to increase. The results in Table 3 imply that the positive impact on self-employment hours that occur through the two channels of the programme: (i) the asset transfer component for households initially capital constrained at baseline (Figure 2A, region (a)); (ii) the skills provision component for households that are unconstrained at baseline (Figure 2B, region (b)), more than offset any wealth effects of livestock asset transfers, despite the transferred livestock being around ten times the value of owned livestock for eligible households at baseline (or more than double the value of per capita expenditures).

A key advantage of engaging in livestock-based forms of self-employment is that such occupational activities are not seasonal. Starting such businesses may therefore help the poor to spread labour effort more evenly across the year and to become less reliant on highly seasonal wage employment in

[25] These results on the extensive and intensive margins of occupational choice are robust to being estimated using non-linear models. Using a probit specification for the outcomes in Columns 1 to 3 yields very similar two and four year impacts, with all coefficients of interest being significant at the 1% significance level. When the hours equations in Columns 4 and 5 are estimated using a Tobit model, the qualitative results are unchanged with all coefficients of interest being significant at the 1% significance level, and quantitatively all the point estimates are larger in absolute value than the OLS estimates as expected.

[26] Although not the focus of this study, we fully recognize that the programme can induce behavioral changes in occupational choices among *other* members of the household, not just the eligible women in each. As our focus is on poverty reduction through basic or subsistence entrepreneurship rather than transformative entrepreneurship (Schoar 2009), the occupational change induced by the TUP programme has little impact on the household's ability to employ non-household members, at least over the four year horizon we study. Appendix Table B4 documents how the hours devoted to wage labour and self-employment change for husbands, other adult members and children in eligible households. Among all three types of family relation, we see little change in hours devoted to wage labour but there are significant increases in hours devoted to self-employment activities. On this margin, the magnitude of these impacts on other family members is far smaller than for eligible women (being between 9% as large for children and 15% as large for husbands). As for eligible women, for each of these household members we see that short run labour supply responses in self-employment are significantly larger than the four year responses.

agricultural markets, or more uncertain income streams from working as a domestic servant. Columns 6 and 7 in Table 3 provide direct evidence on this by estimating the ITT impact of the TUP programme on the share of occupational activities held regularly, defined as those performed at least 300 days per year, and on the share of activities held regularly, defined as the fraction of occupational activities engaged in from which income fluctuates over the year. Column 6 shows that the share of occupational activities held regularly increases by 17pp after four years, a 35% increase relative to baseline. Column 7 shows that after four years the targeted poor have reduced reliance on business activities with seasonal earnings by 8.2pp which represents a 12% reduction relative to baseline.[27]

The final two Columns of Table 3 provide evidence on the overall impact on earnings caused through the occupational choice changes induced by the TUP programme. Column 8 shows that total annual earnings of treated poor women rose by Tk. 1548 after two years, and by Tk. 1754 four years after the programme's initiation. These represent earnings increases of 34% and 38% respectively relative to baseline.

This increase in earnings can arise from changes in the hours devoted to different occupational activities induced by the programme, or changes in the labour productivity within the same activity. On the second channel, Column 9 shows how labour productivity - measured by hourly earnings - increases over time. Two years after the programme's initiation, earnings per hour are not significantly different for eligibles from baseline. Hence, the increased earnings after two years can largely be explained through the arrival of new livestock business opportunities allowing eligible poor women to work significantly more hours, as shown in Column 5. However, after four years, earnings per hour are significantly higher, rising by 15% over their baseline level. Hence, this longer term earnings increase is a combined impact of changes on the intensive margin in hours devoted to more productive self-employment activities ($r_i > w$ as considered in Figure 1A) and the fact that labour productivity has also risen ($r_{i1} > r_{i0}$).

In the Appendix we address the concern that there are significantly more women sole earners at baseline in treated communities than control communities, as shown in Table 2. To confirm that our estimated programme effects are not contaminated by the fact that the occupational choice of sole earners follows a different time trend, Appendix Table B2 reports estimates of (2) for all our baseline outcomes, augmented by an interaction of the survey wave dummy variables with a dummy variable for the eligible woman being a sole earner. Table B2 shows that the estimated programme impacts on the extensive and intensive margins of occupational choice, seasonality, total earnings and earnings per hour are all robust to this more flexible specification. To provide further reassurance that the estimated impacts are not contaminated by the fact that eligible beneficiaries in control communities are too poor to be a valid counterfactual for the poor in treatment communities, Table B3 reports estimates of (2) for all our baseline outcomes using the entire sample (6895) of poor women in control communities, namely including those who control communities deemed to be in the lowest wealth class, as the control group. Table B3 shows that the estimated programme impacts are identical to those obtained using the narrower control group, thus suggesting that all poor households, regardless of whether they are deemed eligible for the programme by BRAC officers, follow a similar time trend in occupational outcomes.[28]

[27] Gharad *et al.* (2011) report findings from an alternative intervention designed to help households cope better with the seasonal fluctuations in agricultural labour demand earnings in rural Bangladesh: the provision of cash incentives to out-migrate. Using an RCT evaluation, they report this incentive induces 22% of households to send a seasonal migrant, and that treated households continue to re-migrate at higher rates after the financial incentive is removed.

[28] All the later findings of the programme's impacts on asset accumulation, per capita expenditures and measures of well-being are also robust to allowing for differential time trends in these outcomes among eligible women that are sole earners or using the alternatively defined control group based on community wealth rankings.

4.3 Programme impacts by baseline occupational choices

Guided by the model, we explore how the responses documented in Table 3 vary by the occupational activities the woman was engaged in at baseline, to provide additional evidence on the nature of constraints eligible women face at baseline. However, to interpret such heterogeneous impacts as causal, requires stronger underlying assumptions to hold than for (2). We first establish that samples are balanced within occupational choice categories at baseline: namely within those engaged in wage labour only at baseline, wage and self-employment, self-employment only. Appendix Table B4 shows the samples to be balanced when we split by occupational choice at baseline. Table 5 then replicates the format of the main outcomes shown in Table 3, split by occupational choice at baseline.[29]

The qualitative patterns of impact on the extensive margin of occupational choice are the same for eligibles, no matter their occupational choices at baseline. The TUP programme leads all eligibles becoming significantly less likely to engage exclusively in wage labour, and significantly more likely to engage in self-employment (all Panels, Columns 1 and 2). Quantitatively, the point estimates on the reduction in the probability the eligible woman is engaged solely in wage labour is greatest for those specialized in wage labour at baseline. The estimated ITT impacts on the extensive margin of occupational choice are also relatively stable two and four after the programme's initiation, suggesting that *none* of the women fall back to their original occupational choices in the longer term, and once BRAC is no longer engaged in implementing the programme.[30]

On the intensive margin we see that among all women (Panels A to C, Columns 4 and 5) there are significant reductions in hours devoted the wage labour, significant increases in hours devoted to self-employment, and significant increases in total labour supply two and four years after the programme's initiation. As shown in Columns 6 and 7, for all women this leads to significant increases in the stability of earnings streams. Column 8 confirms that the programme leads to significantly higher earnings for all women regardless of their occupational status at baseline.

Mapping back to the model, of particular note is the finding that women who were engaged exclusively in self-employment at baseline (Panel C, Table 5) do not reduce their engagement in self-employment activities after the TUP programme is initiated. If, as implied by the model, these women were not capital constrained to begin with (Figure 1A, region b), the positive impacts of self-employment hours arising from the pure skills provision component of the programme (Figure 2B, region b) more than offsets any wealth effect arising from the asset transfer that otherwise would induce them to partially reduce their hours in self-employment (Figure 2A, region b).

Finally, Column 9 on earnings per hour is informative of how changes in labour productivity depend on occupational choice at baseline. Among the poorest eligibles that were engaged only in wage labour at baseline (Panel A), there is a decline in labour productivity in the short term. Four years after the programme's initiation, there is no significant change in earnings per hour. This suggests that at baseline, holding constant earnings per hour, such women were willing to devote more hours to the labour market but could not do so: skills constraints meant it was not optimal to engage in self-employment, and wage labour market opportunities were restricted. These women were effectively underemployed at baseline, and hence part of the TUP programme's impact is to provide employment opportunities to them.

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[29] The difference in difference estimates reported in Table 5 control for all time invariant heterogeneity between treated and control locations but leave open the possibility that outcomes for individuals with different characteristics are naturally trending differently. To the extent that these characteristics differ between treatment and control locations, these trend differences will contaminate the estimates of the programme effects. To address this concern, we supplement specification (2) by additionally controlling for a series of interactions between survey waves and individual characteristics: age, religion, literacy, numeracy, household size, and share of household members that are children, in household. Reassuringly, all the estimated ITT impacts are robust to this with the coefficients of interest and standard errors remaining largely unchanged from those reported in Table 5.

[30] These ITT estimates are difference-in-differences and so can be negative. For example, in Panel C the estimated ITT impact on being specialized in wage labour two and four years after the programme among eligibles that were specialized on self-employment activities at baseline, are negative because specialization in wage employment among such eligibles is rising in control communities.

Table 5. The heterogeneous impacts of the ultra poor programme on the occupational choices and earnings of eligible women

Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Panel A: Specialised in wage labour at baseline								
	(1) Specialized in wage employment (yes=1)	(2) Specialized in self-employment (yes=1)	(3) Engaged in both occupations (yes=1)	(4) Hours devoted to wage employment	(5) Hours devoted to self employment	(6) Share of activities held regularly	(7) Share of activities with seasonal earnings	(8) Total annual earnings	(9) Earnings per hour
Programme effect after 2 years	-0.382***	0.111***	0.301***	-194.382***	577.988***	0.275***	-0.040*	1022.211**	-1.016***
	(0.02)	(0.02)	(0.03)	(53.49)	(32.15)	(0.03)	(0.02)	(408.05)	(0.28)
Programme effect after 4 years	-0.348***	0.155***	0.204***	-264.273***	498.739***	0.259***	-0.090***	1336.128***	-0.127
	(0.02)	(0.02)	(0.03)	(56.51)	(30.08)	(0.03)	(0.03)	(442.78)	(0.33)
Mean of outcome variable in treated communities at baseline	1	0	0	1385.35	0	0.189	0.85	7121.38	5.67
Two year impact = Four year impact (p-value)	.225	.058	.002	.181	.045	.539	.033	.518	.012
Adjusted R-squared	0.609	0.124	0.328	0.136	0.422	0.172	0.117	0.065	0.054
Number of eligible poor women	1863	1863	1863	1863	1863	1863	1863	1863	1863
Observations (clusters)	5589 (826)	5589 (826)	5589 (826)	5589 (826)	5589 (826)	5499 (826)	5499 (826)	5589 (826)	5475 (826)
	Panel B: Engaged in both occupations at baseline								
Programme effect after 2 years	-0.203***	0.108***	0.125***	-151.083***	465.020***	0.166***	0.043*	1555.038***	-0.108
	(0.02)	(0.02)	(0.03)	(50.79)	(35.01)	(0.02)	(0.02)	(494.77)	(0.27)
Programme effect after 4 years	-0.238***	0.146***	0.113***	-192.230***	403.714***	0.185***	-0.062**	2213.902***	0.654**
	(0.02)	(0.02)	(0.03)	(54.11)	(38.17)	(0.02)	(0.03)	(471.33)	(0.29)
Mean of outcome variable in treated communities at baseline	0	0	1	110.55	577.47	0.429	0.668	7180.63	4.36
Two year impact = Four year impact (p-value)	.136	.166	.716	.387	.112	.404	.000	.236	.027
Adjusted R-squared	0.161	0.141	0.212	0.117	0.160	0.099	0.082	0.074	0.068
Number of eligible poor women	1798	1798	1798	1798	1798	1798	1798	1798	1798
Observations (clusters)	5394 (809)	5394 (809)	5394 (809)	5394 (809)	5394 (809)	5331(809)	5331 (809)	5394 (809)	5314 (809)

(Table 5 continued...)

(.... Continued Table 5)

	Panel C: Specialised in self-employment at baseline								
	(1) Specialized in wage employment (yes=1)	(2) Specialized in self-employment (yes=1)	(3) Engaged in both occupations (yes=1)	(4) Hours devoted to wage employment	(5) Hours devoted to self employment	(6) Share of activities held regularly	(7) Share of activities with seasonal earnings	(8) Total annual earnings	(9) Earnings per hour
Programme effect after 2 years	-0.052***	0.090***	0.055***	-38.250*	396.012***	0.137***	-0.072**	1604.816***	0.260
	(0.01)	(0.02)	(0.02)	(23.12)	(43.02)	(0.03)	(0.03)	(352.40)	(0.33)
Programme effect after 4 years	-0.080***	0.093***	0.022	-142.253***	292.388***	0.092***	-0.133***	1947.302***	1.260***
	(0.01)	(0.02)	(0.02)	(29.94)	(47.06)	(0.03)	(0.04)	(393.20)	(0.34)
Mean of outcome variable in treated communities at baseline	1	0	0	0	888.67	0.747	0.54	2878.5	2.49
Two year impact = Four year impact (p-value)	.036	.892	.174	.001	.011	.093	.047	.402	.009
Adjusted R-squared	0.047	0.163	0.111	0.093	0.069	0.057	0.096	0.096	0.068
Number of eligible poor women	2012	2012	2012	2012	2012	2012	2012	2012	2012
Observations (clusters)	6036 (809)	6036 (809)	6036 (809)	6036 (809)	6036 (809)	5842 (809)	5842 (809)	6036 (809)	5764 (809)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS. The panels of the table split eligible women into their occupational choices at baseline. Panel A refers to those that were specialized in wage labour; Panel B refers to those that were engaged in both wage and self employment activities at baseline; Panel C refers to those that were specialized in self-employment at baseline. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves and subdistrict fixed effects. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. All variables are measured on an annual basis. All outcome variables are measured at the individual level (for the eligible woman in the household). All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.

The fact that the total earnings of women previously specialized in wage-employment increase while their hourly earnings remain constant indicates that livestock rearing has the same hourly return as wage employment, but, contrary to wage employment, it keeps these women employed throughout the year and allows them to increase total earnings by increasing hours worked. This is in contrast to those women that were engaged solely in self-employment at baseline (Panel C): for these women labour productivity rises by 50% over its baseline level four years after the programme. Given eligible women owned almost no livestock assets at baseline, the finding that the productivity of women previously specialized in self-employment increases again suggests that the training component was effective at increasing productivity.

5. EXTENDED RESULTS

5.1 Asset accumulation

Women eligible for the TUP programme can choose the form the asset transfer takes from a wide-ranging menu of self-employment activities, including different combinations of livestock and poultry, vegetable cultivation, small-scale retail and crafts like basket weaving. Among those that took-up the offer, over 97% of beneficiaries chose livestock and poultry rearing. Of these 50% chose cows, 38% a combination of cows and poultry, or, cows and goats, and 9% chose a combination that did not include cows (either goats, poultry or both). Different packages were similarly valued at Tk. 9500. Table 6 documents the programme's impacts on household's asset accumulation beyond these initial transfers. The first half of the table focuses on livestock holdings two and four years after the programme's initiation. The second half of the table examines the impact on land holdings, that allows household to further diversify away from earnings from uncertain wage labour markets, and is an intrinsic proxy for social status in these communities.

Table 6 indicates that after two and four years households own more livestock despite being free to dispose of these assets. For cows (the most common transferred asset and one where ownership amongst the targeted poor was negligible at baseline) households have, on average, one more cow after both two and four years, which corresponds to the average number of cows transferred by the programme. The number of poultry and goats also increases in line with average programme transfers (2.42 poultry and .74 goats) though there is a precisely estimated drop in the holdings of these assets between two and four years. This might be due to these assets being more divisible, so their stocks can be adjusted to reach individually optimal holding levels. At end line, less than than 1% of these households reports renting out or sharing livestock. As Column 4 shows, the net impact on the value of livestock holdings is for them to significantly increase by Tk. 9983 and Tk. 10,734 after two and four years. In the short term this is in line with the asset transfer value of Tk. 9500, but rises above this after four years, presumably due to production of offspring and acquisition of new livestock. The differences are significant at conventional levels (p-values of the test of equality of the coefficients to Tk. 9500 are .04 and .00, respectively).[31]

The fact that this upward trajectory continues between two and four years is important as it shows that targeted poor households are successfully operating and growing their businesses during a time when direct assistance by BRAC has been withdrawn. The observed retention and expansion of livestock assets is central to our evaluation as it demonstrates that the poorest women in Bangladesh are capable of basic entrepreneurship in the form of running small businesses which hitherto had largely been the preserve of the middle and upper wealth classes in these communities.

A central question concerns whether or not they have diversified away from these businesses to other activities which are not directly supported by BRAC. Land is the key security asset in rural communities in Bangladesh. Holdings of land, to a large extent, determine standing within the community. Columns 5 and 6 in Table 6 therefore examine whether treated women diversify into renting or owning land. We find that after two and four years treated women are 7pp and 11pp more likely to be renting land and .5pp and 3pp more likely to own land. The upward trend suggests the economic power of these women is rising. These increases which are very large to baseline levels: 188% for renting land

[31] We cannot say whether these are exactly the *same* animals they were given at the beginning of the programme or whether they have been replaced with others. What is key for the interpretation of the results is that two years later the treated poor hold livestock assets of higher value than those they received, which rules out the possibility that they liquidated them to increase short-run consumption. This behavioral response is quite different from that found in Murdoch *et al.* (2012) for a TUP-style programme evaluated in Andhra Pradesh, where they report a significant proportion of households choosing to sell their livestock transfer to pay off debts.

and 38% for owning land. The fact targeted poor households are increasingly engaged in these activities provides a signal that treated women are not sliding back into poverty but rather are solidifying and strengthening their economic base. By using the proceeds from BRAC assisted livestock businesses targeted poor women are investing in the types of assets (land) that provide them with some modicum of long-term security. That this has happened just four years after the programme is indicative of the transformative impact that easing capital and skills constraints has on the economic lives of the poor.

Table 6. The impact of the ultra poor programme on household asset accumulation

Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Livestock				Land	
	(1) Cows	(2) Poultry	(3) Goats	(4) Value of all livestock	(5) Rents land for cultivation	(6) Owns land for cultivation
Programme effect after 2 years	1.075***	2.155***	0.667***	9983.531***	0.069***	0.005
	(0.02)	(0.17)	(0.04)	(240.00)	(0.01)	(0.01)
Programme effect after 4 years	1.063***	1.641***	0.415***	10734.124***	0.109***	0.026***
	(0.03)	(0.15)	(0.03)	(292.77)	(0.01)	(0.01)
Mean of outcome variable in treated communities at baseline	0.083	1.79	0.147	940.31	.058	.068
Two year impact = Four year impact (p-value)	.588	.001	.000	.007	.000	.000
Four year impact = Initial Programme Transfer (p-value)	.541	.000	.000	.000	-	-
Adjusted R-squared	0.414	0.090	0.106	0.328	0.059	0.031
Number of eligible poor women	6732	6732	6732	6732	6732	6732
Observations (clusters)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves and subdistrict fixed effects. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. All outcome variables are measured at the household level. The value of all livestock is the sum of the value of all cows, goats and chickens owned by the household.

5.2 Expenditure and subjective well-being

Table 7 documents how the programme ultimately impacts household welfare, as proxied by per capita expenditures and food security. Columns 1 and 2 show that per capita expenditures on both food and non-food consumption items significantly increase two and four years after the programme's initiation.[32] The impact on non-food expenditure increases between years two and four: they increase by 17% after two years and by 48% after four years (p-value .000). In contrast, the effect on food expenditures

[32] Children under the age of 10 are given a weight of 0.5 to compute adult equivalent per capita consumption. Given that food consumption is measured on a three day recall, as a robustness check we additionally control for whether the household was surveyed during the lean season, and find very similar impacts at midline and end line.

decreases slightly from 6% to 4% of baseline values (p-value .26).[33] Total per capita expenditure increases by 7% and 8% relative to baseline after two and four years, respectively.

Table 7. The impact of the ultra poor programme on expenditure and well-being

Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Expenditures			Well-being	
	(1) PCE non food	(2) PCE food	(3) Food security	(4) Happy (yes=1)	(5) Experience anxiety (yes=1)
Programme effect after 2 years	179.633***	541.35***	0.176***	0.031	0.000
	(64.53)	(178.79)	(0.03)	(0.02)	(0.02)
Programme effect after 4 years	503.356***	331.32*	0.081***	0.064**	0.014
	(83.70)	(169.95)	(0.03)	(0.02)	(0.02)
Mean of outcome variable in treated communities at baseline	1054.5	8861.1	.457	0.404	0.531
Two year impact = Four year impact (p-value)	.000	.260	.000	0.124	0.587
Adjusted R-squared	0.026	0.031	0.185	0.045	0.145
Number of eligible poor women	6732	6732	6732	6732	6732
Observations (clusters)	19266 (1309)	18890 (1309)	20194 (1309)	19237(1309)	19279 (1309)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves and subdistrict fixed effects. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. The outcomes in Columns 1-3 related to consumption are measured at the household level, and the outcomes in Columns 4-5 related to well being are measured at the level of the eligible woman in the household. Total (non-food) per capita expenditure equals the sum of all (non-food) reported expenditures during the previous year divided by adult equivalents. The total per capita food expenditure equals the sum of all food expenditures reported during the previous three days divided by adult equivalents and scaled up to one year. The adult equivalence scale gives weight 0.5 to each child younger than 10. The outcome in Column 3 on food security is a dummy variable equal to one if the household reports being able to afford two meals a day for all members on most days, and zero otherwise. The outcome in Column 4 is a dummy variable equal to one if the individual reports to be satisfied or very satisfied with their life overall, and zero otherwise. In 2007, 1USD=69Tk. The outcome in Column 5 is a dummy variable equal to one if the individual reports experiencing episodes of anxiety over the past year, and zero otherwise.

Households are defined to be food secure if members can afford two meals per day on most days. Column 3 shows that this measure of food security increases by 18pp after two years, and 8pp after four years, corresponding to a 39% and 18% increase from baseline, respectively. Hence, the findings confirm that the reduced earnings seasonality documented earlier in Table 3 translate into smoother patterns of food consumption over the year.[34]

Finally, Columns 4 and 5 report the effect of the programme on two measures of subjective well-being: life satisfaction, and anxiety. On the first measure, individuals were asked to state how satisfied they are with their current life on a 1-4 scale, and we use this to define a dummy equal to one if the individual reports to be satisfied or very satisfied with their life overall on survey date, and zero otherwise. The result suggests the programme improves life satisfaction by 3pp after two years and by 6pp (15% of

[33] Price per calorie increases by 3% and then 4% relative to baseline, suggesting that the increase in expenditure partially reflects an improvement in food quality.

[34] These impacts match very closely to the findings from Banerjee *et al.* (2011) who evaluate a TUP-style pilot programme in West Bengal, tracking 1000 households over an 18 month period. They find consumption expenditures to rise by 15% among households offered the treatment and significant improvements in food security.

the baseline mean) after four. The latter effect is significantly different from zero, and highlights that eligible households do perceive the dramatic changes in their economic lives in the longer term. This is despite the fact that some of them supply significantly more hours to labour market activities, as highlighted in Table 3. We return to this issue on the monetary and utility gains of the programme when we conduct a cost benefit analysis in Section 6.

On anxiety, the outcome in Column 5 is a dummy variable equal to one if the individual reports experiencing episodes of anxiety over the past year, and zero otherwise. On this measure of subjective well-being we find little impact of the programme. The contrasting results in Columns 4 and 5 are in line with recent evidence presenting in Kahneman and Deaton (2010), who argue these types of question relate to quite distinct aspects of well-being.[35]

5.3 Quantile treatment effects on earnings and expenditure

We have thus far focused on the mean impact of the TUP programme on the economic lives of the eligible poor. However, the modeling framework highlights how the TUP programme should induce heterogeneous impacts across eligible households depending on the balance of skills provision and wealth effects induced by the two components of the programme. Moreover, if there are poverty traps then households that are worse off to begin with might be less impacted by the programme. The fact that our data collection exercise covers all eligible households in all treated and control communities allows us to precisely document such heterogeneous impacts. To do so we estimate quantile treatment effects on the difference in difference in earnings and total per capita expenditures using the estimator suggested by Firpo (2007). Figure 4 shows these impacts and the associated 95% confidence bands using bootstrapped standard errors clustered at the community level.

The findings are dramatic: the effect of the programme on earnings and expenditures are indeed heterogeneous but positive at all deciles. On earnings, as shown in Figure 4 (Panel A), four years after implementation the programme impacts are largest at the top deciles of the earning distribution. The differences are sizable: the effect at the ninth decile of earnings is Tk. 4136, and less than one tenth of this value at Tk. 384 at the first decile. As documented in Table 1, the TUP programme appears well-targeted towards the most vulnerable households in these communities. The quantile treatment effects confirm that even the lowest earning individuals within the eligible poor experience significant earnings gains from the programme. Moreover, the fact that treatment effect on earnings is positive at all deciles also rules out the possibility that because of endowment effects or pressure from BRAC officers, treated individuals kept the assets even if this resulted in a loss of earnings.[36]

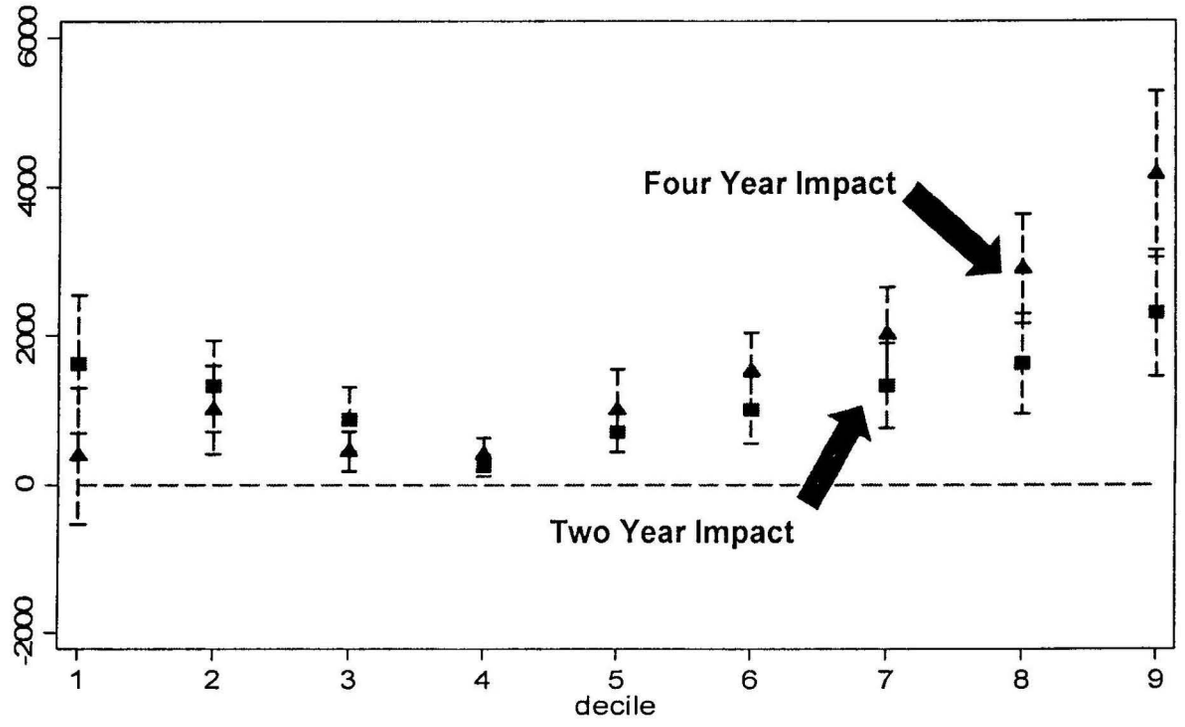
On consumption, as shown in Figure 4 (Panel B), four years after implementation the programme, impacts are largest at the top deciles of the per capita consumption distribution, with the impacts at the top decile being 10 times larger than the point estimate for the first decile. Indeed, four years after its initiation, the TUP does not significantly increase the per capita consumption of households in the lowest two deciles of the distribution of per capita consumption to begin with, although for each decile the point estimate on the four years impact is larger than the two year impacts.

[35] In a sample of US residents, Kahneman and Deaton (2010) find that life satisfaction correlates to income and education; emotional well-being correlates to health, care giving and loneliness.

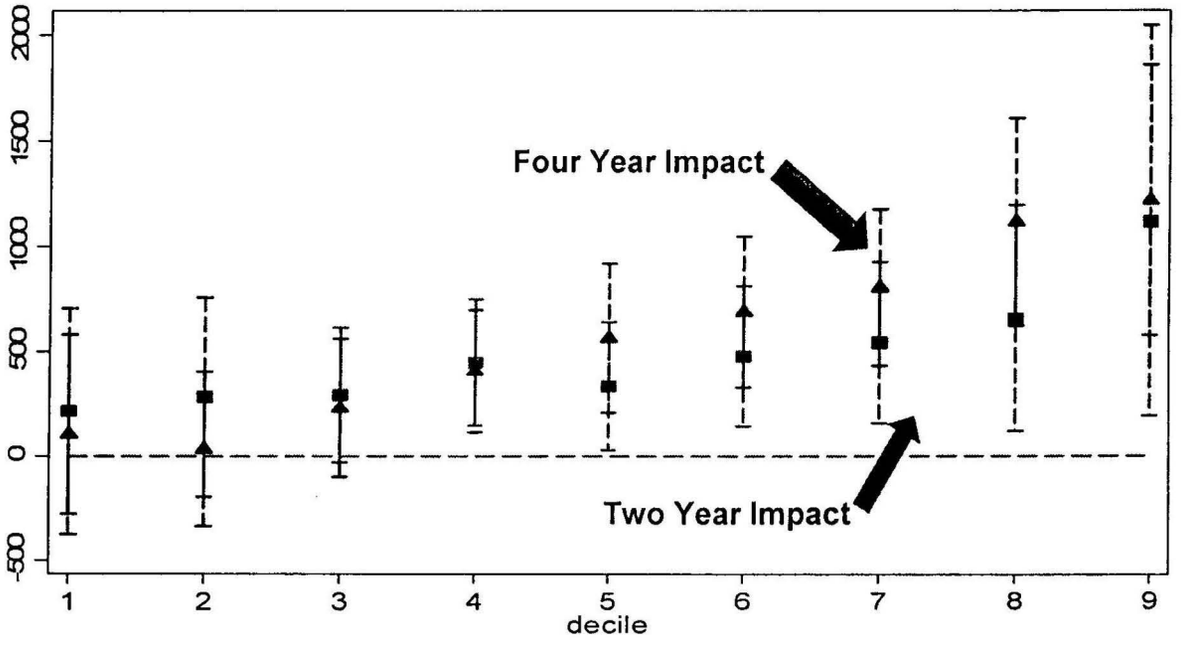
[36] Emran *et al.* (2009) use non experimental research design to estimate quantile treatment effects of the TUP programme, based on tracking 5000 households for a three year period from 2002 to 2005. They also find the impact on earnings to be larger at higher deciles. This finding also resonates with the results in Fafchamps *et al.* (2011), who find that asset transfers to female-owned enterprises in Ghana increase profits only for individuals whose baseline profits were above the median.

Figure 4. Quantile treatment effects

Panel A. Annual earnings of eligible women



Panel B. Total per-capita expenditures in eligible households



Notes: Each point represents the treatment effect at the decile on the x-axis, each bar represents the 95% confidence interval. Squares indicate the quantile treatment effect at midline (two years after the baseline), triangles indicate the quantile treatment effect at end line (four years after baseline). We use the quantile treatment effects estimator proposed by Firpo (2007). Confidence intervals are based on bootstrapped standard errors with 1000 replication clustered at the community level. Panel A refers to annual earnings of eligible women from all labour market activities. Panel B refers to the households total per capita expenditure equals expenditure over the previous year (on food and non-food items) divided by adult equivalents in the household. Theadult equivalence scale gives weight 0.5 to each child younger than 10. In 2007, 1USD=69Tk.

5.4 Closing the gap between the eligible poor and other wealth classes

A key advantage of our partial population experiment and household sample is that it allows us to compare changes in outcomes over time for targeted poor women at baseline relative to other women in higher tiers of Bangladeshi rural society: namely women from near poor, middle and upper class households, as defined by the participatory wealth ranking. In other words, we are able to evaluate the effect of the TUP programme on the gap between the targeted poor women and other women in the same communities, thus providing evidence on whether the programme's impact was large enough to allow significant movements up the class ladder.

Figure 5 benchmarks the effect of the programme vis-à-vis the gap between the treated poor and other wealth classes on seven key outcomes covering occupational choice, asset holdings and expenditures. For each outcome k we construct the point estimate and confidence interval of the following ratio, $\frac{\hat{\beta}_2^{k_{TP}}}{\bar{k}_{0C} - \bar{k}_{0TP}}$, ---------- (3)

where $\hat{\beta}_2^{k_{TP}}$ is the ITT impact of the programme on outcome k for the treated poor at end line, estimated from (2), and $\bar{k}_{0C} - \bar{k}_{0TP}$ is the baseline difference in the mean of outcome k between class C and the treated poor (TP) in treated communities, where recall that households are assigned to wealth classes in the community ranking exercise. Each dot in Figure 5 then represents this ratio of the programme effect for outcome k. Panel A reports these gaps between the treated poor and the near poor, and Panel B reports the gaps between the treated poor and the middle classes, with associated 95% confidence interval.

For ease of interpretation, Figure 5 also reports a vertical line at one: that is the size programme effects need to be in order to entirely close the gap (so that $\hat{\beta}_2^{k_{TP}} = \bar{k}_{0C} - \bar{k}_{0TP}$). To be clear, an estimated impact of one suggests the causal impact of the TUP programme is to entirely close the gap between eligible households and the class of households being compared to (be they near poor or middle class households); an impact less than one suggests the programme causes eligible households to close part of the gap; and an estimated impact significantly greater than one suggests the causal impact of the programme is large enough so that eligible households *overtake* the comparison households on that margin. Of course a negative impact would imply eligible households actually diverge further away from other classed households on that margin.[37]

Panel A of Figure 5 benchmarks the programme impacts on eligible households relative to their initial gap with near-poor households. The TUP programme closes the gap between the treated poor and the near-poor class of households in all dimensions except land ownership. Indeed, on four outcomes the estimated impact is significantly larger than one suggesting that the effects on specialization in wage employment, livestock ownership and per-capita expenditures are such that the gap is reversed. Hence on these dimensions the targeted poor actually *overtake* the near-poor.

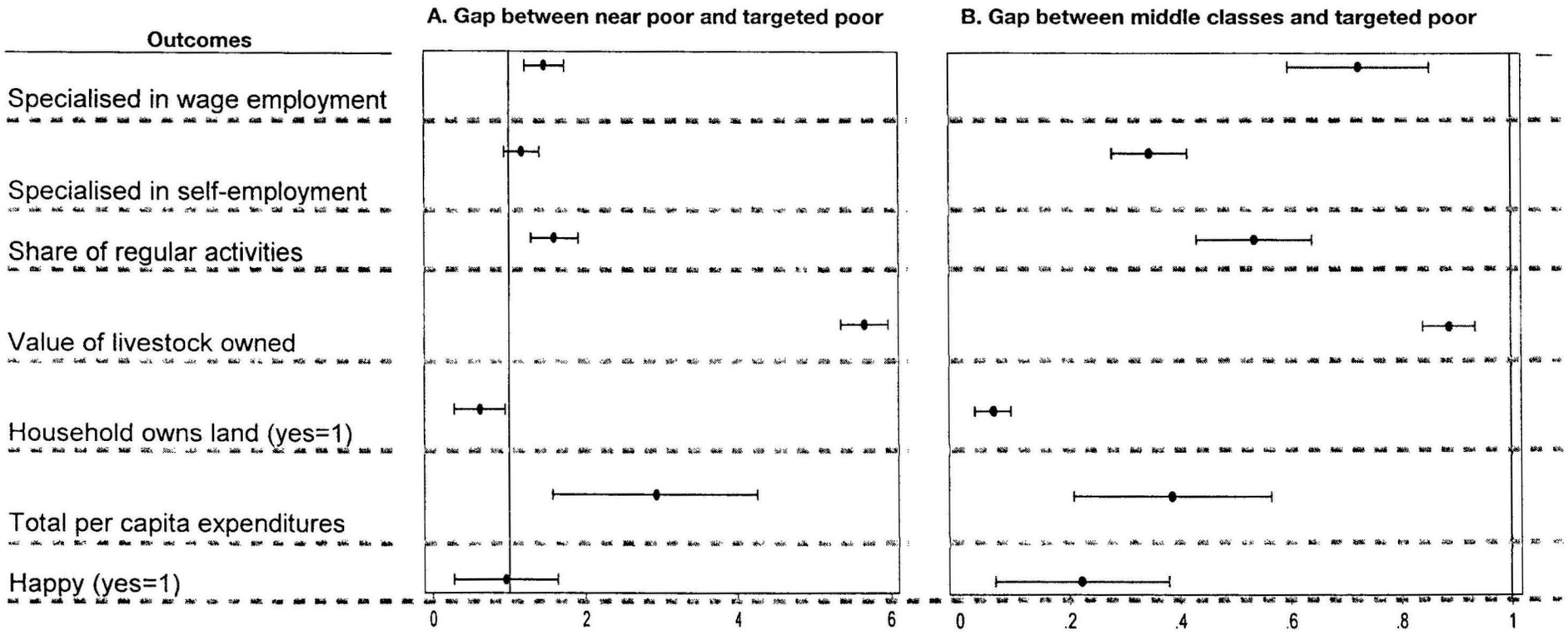
Panel B shows that the programme goes a long way to reduce the gap between the treated poor and the middle classes. On most dimensions, the effect of the programme covers at least 40% of the gap. The one exception is land ownership. While we do find that the programme allows some beneficiaries to purchase land, the share of targeted poor who manage to do so is still negligible compared to the prevalence of land ownership among the middle classes. While wealth inequality

[37] We use baseline differences to measure relative gaps. Alternatively, we could have normalized the ITT impacts by survey wave t relative to the gaps between classes in control communities measured contemporaneously in wave t. We have not done so because this confounds any impacts of the programme on the treated poor with potential changes in outcomes among other classes through general equilibrium impacts. Such mechanisms and spillovers are central to our ongoing work (Bandiera *et al.* 2012).

remains high, the expenditure gap is noticeably reduced as the programme effect covers almost half of the baseline gap in total per capita expenditures.

These findings highlight how the programme helps narrow within community inequality by raising the eligible poor to and beyond the economic circumstances of the near poor. At the same time, the results from the earlier quantile treatment effects also showed the programme to increase earnings and consumption inequality within the eligible poor themselves. These two dynamics, as well as other potential community general equilibrium impacts of the programme generate a rich set of social dynamics that will be the focus of future research.

Figure 5. The impact of the ultra poor programme on the gap between other classes and the eligible poor



Notes: Each dot represents the impact of the programme on the outcome on the left hand side column divided by the initial gap between the near poor and the eligible poor (Panel A) and between middle classes and the eligible poor (Panel B). The vertical line at one indicates the level at which the effect of the programme is such to close the gap. The horizontal bars represent 95% confidence intervals based on standard errors clustered by community. All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. Household total per capita expenditure equals expenditure over the previous year (on food and non-food items) divided by adult equivalents in the household. The adult equivalence scale gives weight 0.5 to each child younger than 10. In 2007, 1USD=69Tk.

6. A COUNTERFACTUAL POLICY: UNCONDITIONAL CASH TRANSFERS

All the documented evidence suggests the TUP programme has large and sustained impacts on the occupational choices and economic lives of the eligible poor. We have shown that after four years, beneficiaries' annual earnings increase by Tk. 1754 (Table 3, Column 8), corresponding to a 38% increase over their baseline levels. At the same time, the programme comes at a high cost per potential beneficiary: Tk. 20,700 (sound 300USD) per household, including the value of the livestock asset, the cost of training and BRAC operating costs specific to the programme. Most of these costs are incurred in the first two years of the programme, when asset transfers takes place and training provided. Indeed, BRAC is not involved in the day-to-day running of the programme in communities after two years of intervention. Hence, given the documented stability in annual earnings gains moving from two to four years post-intervention (Table 3, Column 8) it is reasonable to suppose that the net present value of gains to eligible households are likely to more than offset the lifetime costs of the programme.

The more substantive question is whether the same resources could have been better utilized if targeted to the same households under an alternative policy. The natural counterfactual policy is an unconditional cash transfer of the same magnitude.[38] To compare these, we need to make assumption on how the cash would be spent. Theoretically, beneficiaries could use the cash to start a business they are better suited for. In practice, this is unlikely in our setting as the TUP programme actually offers an exhaustive *menu* of small-scale entrepreneurial activities, including livestock rearing options, small retail outlets, or the production of small crafts such as basket weaving. Assuming beneficiaries can safeguard the transfer, one option is to deposit the cash in a savings account and consume the accrued interest every year. In our setting, however, formal bank accounts are rare. While 54% of the sample households across all wealth classes have savings, only 3.6% keep these in a bank account and in 62% of the communities, none of the surveyed households have a bank account. Saving accounts with MFIs are more common: 21% of households report having one, and we find at least one household with an MFI saving account in 79% of communities.[39]

Assuming all beneficiaries would have access to MFI savings accounts, these pay rates of between 4% and 5% in rural Bangladesh during our study period (Moulick et al. 2011). An equivalent cash transfer of Tk. 20,700 at 4.5% then yields an annual flow payment of Tk. 932 after four years, which deflated by the same factor of livestock income (by the rural CPI) is equivalent to Tk. 700. This is significantly lower than the average programme effect on annual earnings of Tk. 1754 (p-value .001) as reported in Column 8 of Table 3.

The earnings comparison however does not capture all the relevant information needed to compare the change in *utility* associated with the programme with the change in utility that would accrue with a cash transfer. Besides increasing earnings, the programme transforms the occupational structure of the treated by shifting them from wage employment to self-employment, increasing the number of days they

[38] A potential alternative might have been to consider the relative returns to enabling the targeted poor to start other basic entrepreneurial activities outside of the livestock sector. However recall that the TUP programme BRAC actually offers eligible women a *menu* of small-scale entrepreneurial activities they could engage in, including livestock rearing options, small retail outlets, or the production of small crafts such as basket weaving. As over 97% of eligibles choose livestock related activities, it appears less likely there exists other more profitable forms of self-employment for these households, unless of course households have poorer information at baseline on the returns to those non-livestock forms of basic entrepreneurship.

[39] These findings are in line with an earlier literature suggesting that livestock is often the most important savings device or store of value in South Asia, as alternatives are rare (Rosenzweig and Wolpin 1993).

work per year, reducing the number of hours per day and their exposure to seasonality. If the daily cost of effort is convex or if the treated have limited access to consumption smoothing technologies, these changes might increase utility other things equal. On the other hand, the programme increases total labour supplied and correspondingly reduces leisure by 219 hours, and this reduces utility, all else equal.

Quantifying utility differentials due to these factors is difficult. Even assuming that the change in occupational structure does not positively affect utility directly through any utility gains from being able to smooth earnings over the year, quantifying the loss of utility due to the increase in hours worked is challenging because labour demand exhibits strong seasonality and the wage observed in the peak season is not a good measure of the opportunity cost of leisure throughout the year. In other words, as a result of the programme, beneficiaries work more hours in periods when there is no demand for their labour in the casual market, which implies that by this measure the opportunity cost of leisure is zero. Similarly, opportunities to engage in self-employment are limited by capital constraints, so the observed hourly return to self-employment activities cannot be used to price leisure either.

To bound the value of foregone leisure we use a revealed preference argument in combination with the quantile treatment effects on earnings shown in Figure 4: this varies enormously across the treated poor and is much higher at higher quantiles. Repeating this for hours, quantile treatment estimates reveal that the increase in hours worked is roughly constant across the conditional distribution of hours, as all beneficiaries receive similar assets that require a similar amount of work. By revealed preference, beneficiaries at all deciles of the earnings distribution must be at least as well off with the programme as without it. Assuming that the beneficiaries with the lowest earnings gain are indifferent between taking up the programme or not, this implies the value of 219 hours of forgone leisure is equal to Tk. 370. Assuming that all beneficiaries have the same linear preferences for earnings and leisure, all beneficiaries with earnings higher than 700+370 =Tk. 1070 are then better off with the programme than with an equivalent cash transfer. The programme is thus preferred by the average beneficiary and all beneficiaries at or above the 6th decile of the earnings distribution, while those below would have been better off with an unconditional cash transfer.

However, this counterfactual policy scenario likely overestimates the set of beneficiaries that would be better off with an unconditional cash transfer for two reasons. First, we have placed no weight on the fact that there are utility gains to the treated poor from the programme enabling them to smooth their earnings and consumption over the year. Second, we have assumed beneficiaries are able to save *all* of an unconditional cash transfer, and consume *all* of the interest payments received from this lump sum. There is however a body of evidence from developing country settings suggesting households are unable to do this because of the claims of extended family members on resources obtained by eligible households.[40] Clearly, taking into account such issues of earnings smoothing and resources leaking away from intended beneficiaries, implies the TUP programme might indeed be preferred by the majority of the poor relative to an unconditional cash transfer of the same value.

[40] For example, using data from the *Progresa* conditional cash transfer programme in rural Mexico, Angelucci *et al.* (2010) show that eligible households transfer resources towards their non-eligible relatives, so that for every peso received by eligible households, their relatives' food consumption expenditure increases by 13 cents.

7. CONCLUSION

The question of what keeps people mired in poverty is one of the oldest in economics. We have presented evidence that the lack of capital and skills determines occupational choice and, through this, poverty. A large, simultaneous, transfer of both assets and skills through the TUP programme has had large and permanent impacts on the occupational choices and earnings of the targeted poor, dispelling the view that the extreme poor are inalienably dependent on the non-poor via employment and other relationships (Scott 1977). More broadly, the findings suggest that the myriad of other potential constraints, unrelated to capital and skills, but revolving around information constraints on the perceived returns to capital or human capital investments (Jensen 2010, 2012, Townsend 2011), self-control or other behavioral biases, leakage of assistance to other's claims (Reinikka and Svensson 2004, Angelucci *et al.* 2010), or social norms (Field *et al.* 2010), are not sufficient to prevent the very poorest taking up opportunities in basic entrepreneurship when provided with sufficiently large injections of capital and skills. When such constraints are relaxed, we find the poor are able to begin breaking this dependence on the non-poor via employment relations and start taking on their own economic activities based around livestock rearing (Popkin 1979, Schultz 1974).[41]

In thinking about why the TUP programme is successful and whether our findings might apply to other settings three factors would appear to be important. First is the complementarity between capital and skills, so that availability of capital might not sufficient to start new businesses in the absence of complementary training, and training might not be sufficient without capital.[42] This is consistent with the lacklustre performance of microfinance in creating new businesses (Banerjee *et al.* 2010, *Crèponet al.* 2011, Karlan and Zinman 2011, Kaboski and Townsend 2011, 2012) and with the similarly disappointing performance of short-term training for existing microentrepreneurs, which have generally been found ineffective at increasing profits and business growth (Field *et al.* 2010, Drexler *et al.* 2010, Karlan and Valdivia 2011, Fairlie *et al.* 2012, Bruhn *et al.* 2012).[43] It is also consistent with the fact that while microloans were offered in the villages we study, the treated women were not using them.

Second is the size of both the asset and skill transfer. On the asset front, the lumpiness of the investment required to start a small business might be such that the size of the typical microloan and its repayment requirement might not be sufficient to fund it. Indeed, recent evaluations show that the introduction of microfinance only improves the profitability of established businesses. Building on this, Field *et al.* (2012) present evidence from a field experiment in India demonstrating that a feature of classic microfinance contracts, requiring repayment to begin almost immediately after loan disbursement, discourages illiquid risky investments, thereby limiting the impact of microfinance on

[41] Gulesci (2012) also find results in this direction. Treated women, who often insured themselves by forward selling labour in return for current consumption, break these ties with landowners when they begin to operate their own businesses and enter into more reciprocal insurance arrangements with households that are closer to them in terms of wealth.

[42] Recent evaluations of business training programmes for aspiring entrepreneurs with and without capital grants (de Mel *et al.* 2012) provide evidence of such complementarity.

[43] Field *et al.* (2010) report results from an RCT that provides basic financial literacy training to a randomly selected group of female entrepreneurs in India. Only a socially restricted sub-group was found to benefit from the intervention in terms of business income and borrowings. Drexler *et al.* (2010) find that teaching accounting principles to a group of micro-borrowers in the Dominican Republic has no impact on either the way they run their business nor on business outcomes. However, simple rule-of-thumb style training does affect the way in which financial records are kept. Karlan and Valdivia (2011) investigate the impact of a relatively intense training intervention of up to two years, that delivered comprehensive training on business practices to, clients of a Peruvian Microfinance institution. Despite improving business knowledge, the intervention failed to impact any major business outcomes. Fairlie *et al.* (2012) find that providing entrepreneurs training has no measurable impact on business operations in the long-run. Finally, more recent evidence in Bruhn *et al.* (2012) suggests granting small and medium enterprises in Mexico access to consulting services, has large positive impacts on firm profits, although not their employment.

entrepreneurial activities and poverty reduction. This also echoes the findings of a recent literature that shows how the effect of cash transfers to microenterprises depends on baseline profitabi ity, suggesting that capital transfers are not sufficient to make subsistence-level enterprises grow (McKenzie *et al.* 2008; Fafchamps *et al.* 2011). Similarly, the training offered as part of the TUP programme is much more intensive and long-lasting than the standard classroom based business training programmes evaluated in the literature.

Third, the programme was implemented in a context where the beneficiaries' alternative occupation, casual wage labour, is not attractive. This is in sharp contrast to the setting studied in Murdoch *et al.* (2012) where wage labour opportunities steadily improve over time because of the expansion of government-provided, well-remunerated and stable jobs. In that setting, the uptake of the UP-style programme is much lower and its impact one year after implementation very limited.

When we think about occupational change and the structural transformation of economies we tend to think about the shift of people from agriculture into manufacturing and services, from the countryside to the city. The type of in situ occupational change we are observing here is probably no less important and as Figure 3 highlights, the natural process of structural transformation in control communities is painfully slow. We find that investments in capital and human capital are enabling poor women to move up a clearly defined occupational ladder away from the bottom rung of insecure wage employment and towards self-employment. This may be structural change writ small but, as we demonstrate, the gains from moving up the occupational ladder are considerable. Given the centrality of occupational change to overall development and growth it would seem that programmes which enable poor people to upgrade occupations, rather than just make them more productive in a given occupation, deserve greater attention.

REFERENCES

Aghion P, Howitt P, Mayer D (2005). The effect of financial development on convergence. *Quarterly J Econ* 120 (1):173-222.

Ahmed AU, Rabbani M, Sulaiman M, Das NC (2009). The impact of asset transfer on livelihoods of the ultra poor in Bangladesh. Dhaka: BRAC. 56p. (Research Monograph Series 39)

Angelucci M and De Giorgi G (2009). Indirect effects of an aid programme: how do liquidity injections affect non-eligibles' consumption? *Am Econ Rev* 99:486-508.

Angelucci M, De Giorgi G, Rangel MA, Rasul I (2010). Family networks and schooling outcomes: evidence from a randomized social experiment. *J Public Econ* 94:197-221.

Alatas V, Banerjee AV, Hanna R, Olken B, Tobias J (2012). Targeting the poor: evidence from a field experiment in Indonesia. *Am Econ Rev* 101:1206-40.

Bandiera O, Burgess R, Das N, Gulesci S, Rasul I, Sulaiman M (2012). Community wide impacts of an ultra-poor programme. London: London School of Economics. (Mimeo)

Banerjee A (2004). Contracting constraints, credit markets, and economic development. *In:* Dewatripoint M, Hansen L, Turnovsky S (Editors). Advances in economics and econometrics: theory and applications. Eighth World Congress of the Econometric Society, Volume III. Cambridge: Cambridge University Press. p1-46.

Banerjee AV and Duflo E (2007). The economic lives of the poor. *J Econ Perspect* 21:141-68.

Banerjee AV and Duflo E (2008). What is middle class about the middle classes around the world? *J Econ Perspect* 22:3-28.

Banerjee AV, Duflo E, Chattopadhyay R, Shapiro J (2011). Targeting the hardcore poor: an impact assesment. MIT. (Mimeo)

Banerjee AV, Duflo E, Glennerster R, Kinnan C (2010). The miracle of microfinance? evidence from a randomized evaluation. MIT. (Mimeo)

Banerjee AV and Mullainathan S (2010). The shape of temptation: implications for the economic lives of the poor. (NBER Working Paper 15973)

Banerjee AV and Newman AF (1993). Occupational choice and the process of development. *J Political Econ* 101:274-98.

Becker GS (1964). Human capital: a theoretical and empirical analysis, with special reference to education. Chicago: University of Chicago Press.

Besley T (1995). Savings, credit, and insurance. *In:* Srinivasan TN and Behrman J (Ediotrs). Handbook of development economics, Vol. 3A. Amsterdam: Elsevier, p2125-207.

Bruhn M, Karlan D, Schoar A (2012). The impact of consulting services on small and medium enterprises: evidence from a randomized trial in Mexico. Yale University. (Mimeo)

Bryan G, Chowdhury S, Mobarak AM (2011). Seasonal migration and risk aversion: experimental evidence from Bangladesh. London: London School of Economics. (Mimeo)

Buera F and Kaboski JP (2012). The rise of the service economy. *Am Econ Rev* 102:2540-69.

Bruhn M and Mckenzie D (2009). In pursuit of balance: randomization in practice in development field experiments. *Am Econ J: Applied Econ* 1:200-32.

Caselli F and Coleman WJ (2001). The U.S. structural transformation and regional convergence: a reinterpretation. *J Political Econ* 109(3):584-616.

Crèpon B, Devoto F, Duflo E, Parientè W (2011). Impact of microcredit in rural areas of Morocco: evidence from a randomized evaluation. MIT. (Mimeo)

Das NC and Misha FA (2010). Addressing extreme poverty in a sustainable manner: evidence from the cfpr programme. Dhaka: BRAC. 36p. (CFPR Working Paper 19)

de Mel S, McKenzie D, Woodruff C (2008). Returns to capital in microenterprises: evidence from a field experiment. *Quarterly J Econ* 123(4):1329-72.

Drexler A, Fischer G, Schoar A (2010). Keeping it simple: financial literacy and rules of thumb. (CEPR Discussion Paper 7994)

Drèze J and Sen AK (1989). Hunger and public action. Oxford: Oxford University Press.

Emran MS, Robano V, Smith SC (2009). Assessing the frontiers of ultra-poverty reduction: evidence from CFPR/TUP. An innovative programme in Bangladesh. George Washington University. (Mimeo)

Fafchamps M, McKenzie DJ, Quinn S, Woodruff C (2011). When is capital enough to get female microenterprises growing? Evidence from a randomized experiment in Ghana. (CEPR Discussion Paper 8466)

Fairlie R, Karlan D, Zinman J (2012). Behind the GATE experiment: evidence on effects of and rationales for subsidized entrepreneurship training. Yale University. (Mimeo)

Field E, Jayachandran S, Pande R (2010). Do traditional institutions constrain female entrepreneurial investment? A field experiment on business training in India. *Am Econ Rev Papers and Proceedings*: 100:125-29.

Field E, Pande R, Papp J, Rigol N (2012). Does the classic microfinance model discourage entrepreneurship among the poor? Experimental evidence from India. *Am Econ Rev* (In press)

Firpo S (2007). Efficient semiparametric estimation of quantile treatment effects. *Econometrica* 75(1):259-76.

Gulesci S (2012). Labour-tying and poverty in a rural economy: evidence from Bangladesh. Bocconi University. (Mimeo)

Imbens G and Wooldridge JM (2009). Recent developments in the econometrics of programme evaluation. *J Econ Literature* 47:5-86.

Jensen R (2010). The (perceived) returns to education and the demand for schooling. *Quarterly J Econ* 125:515-48.

Jensen R (2012). Do labour market opportunities affect young women's work and family decisions? Experimental evidence from India. *Quarterly J Econ* 127:753-92.

Kaboski J and Townsend RM (2011). A structural evaluation of a large-scale quasi-experimental microfinance initiative. *Econometrica* 79:1357-406.

Kaboski J and Townsend RM (2012). The impact of credit on village economies. *Am Econ J: Applied Econ* 4:98-133.

Kahneman D and Deaton A (2010). High income improves evaluation of life but not emotional well-being. Proceedings of the National Academy of Sciences, Early Edition (September 6).

Karlan D and Valdivia M (2011). Teaching entrepreneurship: impact of business training on microfinance clients and institutions. *Rev Econ Stat* 93:510-27.

Karlan D and Zinman J (2011). Microcredit in theory and practice: using randomized credit scoring for impact evaluation. *Science* 332:1278-84.

Khandker S and Mahmud W (2012). Seasonal hunger and public policies: evidence from northwest Bangladesh. Washington, D.C.: World Bank.

King RG and Levine R (1993). Finance and growth: schumpeter might be right. *Quarterly J Econ* 108:717-37.

Matsuyama K (1992). Agricultural productivity, comparative advantage, and economic growth. *J Econ Theory* 58:317-34.

Miguel E and Kremer M (2004). Worms: identifying impacts on education and health in the presence of treatment externalities. *Econometrica* 72:159-217.

Morduch J (1988). Do microfinance programmes really help the poor? New evidence from a flagship programme in Bangladesh. Harvard University. (Mimeo)

Morduch J and Karlan D (2009). Access to finance. *In:* Rodrik D and Rosenzweig M (Editors). Handbook of development economics, Vol 5. Amsterdam: Elsevier. p4704 – 84.

Morduch J, Ravi S, Bauchet J (2012). Failure vs. displacement: why an innovative anti-poverty programme showed no impact. CGAP. (Mimeo)

Moulick M, Mukherjee P, Rahman SM, Wright GAN (2011). Deposit assessment in Bangladesh. (IFC Report)

Murphy K, Shleifer A, Vishny R (1989). Income distribution, market size, and industrialization. *Quarterly J Econ* 104:537-56.

Ngai LR and Pissarides CA (2007). Structural change in a multi-sector model of growth. *Am Econ Rev* 97:429-43.

Reinikka R and Svensson J (2004). Local capture: evidence from a central government transfer programme in Uganda. *Quarterly J Econ* 119:679-706.

Rosenzweig M and Wolpin KI (1993). Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: investment in bullocks in India. *J Political Econ* 101:223-44.

Schoar A (2009). The divide between subsistence and transformational entrepreneurship. MIT. (Mimeo)

Schultz TW (1961). Investment in human capital. *Am Econ Rev* 51:1-17.

Schultz TW (1980). Nobel lecture: the economics of being poor. *J Political Econ* 88:639-51.

Townsend RM (2011). Financial systems in developing economies: growth, inequality and policy evaluation in Thailand. Oxford: Oxford University Press.

APPENDIX

Appendix A.

Proof of proposition 1: The FOCs from (1) for L_i and S_i are, respectively,

$$wu'(wL_i + r_iS_i + I_i) - v'(1 - L_i - S_i) + \alpha = 0$$

$$r_iu'(wL_i + r_iS_i + I_i) - v'(1 - L_i - S_i) + \beta - p_k\gamma = 0.$$

We first solve these assuming $r_i > w$, in which case there are four cases to consider, and in each case we derive the endowment levels that would lead to the case being an optimal choice.

Case (a): Suppose the individual finds it optional not to engage in either occupational activity so $L_i^* = S_i^* = 0$. Then $\alpha \geq 0$ and $\beta \geq 0$ and the FOCs reduce to,

$$wu'(I_i) - v'(1) + \alpha = 0, \tag{4}$$

$$r_iu'(I_i) - v'(1) + \beta = 0. \tag{5}$$

As $r_i > w$, this implies $(r_i - w)u'(I_i) + \beta - \alpha \geq 0$, so $\alpha > \beta > 0$ as required in this case. For very large I_i it is optimal for the individual to supply no hours to either occupational activity. Both first order conditions are decreasing in I_i so the smallest endowment at which it remains optimal to devote no amount of time to self-employment denoted $\tilde{I}_i$ is unique and implicitly solves $r_iu'(\tilde{I}_i) - v'(1) = 0$. Hence, for all endowments $I_i \geq \tilde{I}_i(r_i)$ it is optimal for the individual to supply zero time to self-employment. It is straightforward to show that,

$$\frac{d\tilde{I}_i}{dr_i} = -\frac{u'(\tilde{I}_i)}{r_iu''(\tilde{I}_i)} > 0, \frac{d\tilde{I}_i}{dw} = 0. \tag{6}$$

Finally note that the smallest endowment level at which $\alpha = 0$ and (4) is then satisfied implies $wu'(I_i) - v'(1) = 0$, but then $(r_i - w)u'(I_i) + \beta - \alpha = 0$ cannot be satisfied. Hence, when $r_i > w$, it will never be optimal for an individual to supply a positive amount of wage employment *and* engage in zero self-employment. Hence, for all endowments $I_i \geq \tilde{I}_i(r_i)$, $L_i^* = S_i^* = 0$.

Case (b): Suppose the individual finds it optimal to not supply any wage employment, but to engage in some strictly positive amount of self-employment where they have a sufficiently large resource endowment so the capital constraint does not bind, $p_kK_i < I_i$. Hence, $L_i^* = 0$, and $S_i^* \in (0, \frac{I_i}{p_k})$. In this case $\alpha \geq 0$, $\beta = 0$ and $\gamma = 0$ because the individual is not capital constrained in self-employment and the FOCs reduce to,

$$wu'(r_iS_i^* + I_i) - v'(1 - S_i^*) + \alpha = 0, \tag{7}$$

$$r_iu'(r_iS_i^* + I_i) - v'(1 - S_i^*) = 0. \tag{8}$$

The FOC for self-employment (8), that is decreasing in I_i, then pins down the smallest endowment for which the capital constraint for self-employment just begins to bind. However it might be the case that this constraint binds before the endowment level implicitly defined in (8) is reached. To check which is the more binding constraint, note that $r_i S_i^* = [p_y\theta_i - p_k]S_i^*$ and substituting this into (8) we have that, $r_i u'([p_y\theta_i - p_k]S_i^* + I_i) - v'(1-S_i^*) = 0$. As $[p_y\theta_i - p_k]S_i^* + I_i \geq 0$, then $I_i \geq p_k S_i^* - p_y\theta_i S_i^*$ so $I_i \geq p_k S_i^*$ is the more binding constraint. Hence, we first solve for S_i^* from (8) to derive the lowest endowment level in this case, denoted $\tilde{\tilde{I}}_i$, and then substitute the solution into the capital constraint to derive the relevant comparative static properties of $\tilde{\tilde{I}}_i$. Totally differentiating (8) it is straightforward to derive the following results,

$$\frac{dS_i^*}{dI_i} = -\frac{r_i u''(r_i S_i^* + I_i)}{r_i^2 u''(r_i S_i^* + I_i) + v''(1-S_i^*)} < 0, \frac{dS_i^*}{dr_i} = -\frac{\left[u'(r_i S_i^* + I_i) + r_i S_i^* u''(r_i S_i^* + I_i)\right]}{r_i^2 u''(r_i S_i^* + I_i) + v''(1-S_i^*)}, \tag{9}$$

so $sign\left[\frac{dS_i^*}{dr_i}\right] = sign\left[u'(r_i S_i^* + I_i) + r_i S_i^* u''(r_i S_i^* + I_i)\right]$ so that $\frac{dS_i^*}{dr_i} > 0$ if the substitution effect dominates in $u(.)$ and $\frac{dS_i^*}{dr_i} < 0$ if the income effect dominates. At the lowest endowment level in this case the capital constraint just starts to bind so,

$$\tilde{\tilde{I}}_i = p_k S_i^*(r_i, \tilde{\tilde{I}}_i). \tag{10}$$

To see the properties of this boundary endowment level we can totally differentiate (10) to show that,

$$\frac{d\tilde{\tilde{I}}_i}{dr_i} = \frac{p_k \frac{dS_i^*}{dr_i}}{1 - p_k \frac{dS_i^*}{dI_i}} > 0, \tag{11}$$

if the substitution effect dominates (as $\frac{dS_i^*}{dr_i} > 0$ in that case), and is negative if the income effect dominates. Finally note that if a positive amount of wage employment is supplied in this range then $\alpha = 0$ and both FOCs (7) and (8) cannot simultaneously be satisfied for $r_i > w$. Hence, for all endowments $I_i \in [\tilde{\tilde{I}}_i, \tilde{I}_i)$, $L_i^* = 0$ and $S_i^* = S_i^*(r_i, I_i) \leq \frac{I_i}{p_k}$.

Case (c): Suppose the individual finds it optimal to not supply any wage employment, but to engage in some strictly positive amount of self-employment where they are liquidity constrained so $p_k S_i = I_i$. Hence, $L_i^* = 0$, $S_i^* = \frac{I_i}{p_k}$ and $\alpha > 0$, $\beta = 0$ and $\gamma > 0$ and the FOCs reduce to,

$$wu'(r_i \frac{I_i}{p_k} + I_i) - v'(1 - \frac{I_i}{p_k}) + \alpha = 0, \tag{12}$$

$$r_i u'(r_i \frac{I_i}{p_k} + I_i) - v'(1 - \frac{I_i}{p_k}) - \gamma = 0. \tag{13}$$

As usual the FOCs are decreasing in I_i and so (12) can be used to implicitly define the smallest endowment level, denoted $\tilde{\tilde{I}}_i$, at which it just becomes optimal for $L_i^* > 0$,

$$wu'(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) - v'(1 - \frac{\tilde{\tilde{I}}_i}{p_k}) = 0. \tag{14}$$

Unlike the endowment thresholds between the cases considered earlier, this threshold depends on the wage rate as expected. The comparative static properties of this threshold are straightforwardly derived from totally differentiating (14),

$$\frac{d\tilde{\tilde{I}}_i}{dw} = -\frac{u'(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i)}{\left[w(\frac{r_i}{p_k} + 1)u''(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) + \frac{1}{p_k} v''(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) \right]} > 0, \tag{15}$$

$$\frac{d\tilde{\tilde{I}}_i}{dr_i} = -\frac{w \frac{\tilde{\tilde{I}}_i}{p_k} u''(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i)}{\left[w(\frac{r_i}{p_k} + 1)u''(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) + \frac{1}{p_k} v''(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) \right]} < 0. \tag{16}$$

As the capital constraint binds, $S_i^* = \frac{I_i}{p_k}$, and so $\frac{dS_i^*}{dI_i} = \frac{1}{p_k} > 0$, and $\frac{dS_i^*}{dr_i} = \frac{dS_i^*}{dw} = 0$. Hence, for all endowments $I_i \in [\tilde{\tilde{I}}_i, \tilde{I}_i)$, $L_i^* = 0$ and $S_i^* = \frac{I_i}{p_k}$.

Case (d): Suppose the individual finds it optimal to supply a strictly positive amount of wage employment, and to engage in some strictly positive amount of self-employment where they are liquidity constrained so $p_k S_i = I_i$. Hence, $L_i^* > 0$, $S_i^* = \frac{I_i}{p_k}$ and $\alpha = \beta = 0$, $\gamma > 0$ so the FOCs reduce to,

$$wu'(wL_i + r_i \frac{I_i}{p_k} + I_i) - v'(1 - L_i - \frac{I_i}{p_k}) = 0, \tag{17}$$

$$r_i u'(wL_i + r_i \frac{I_i}{p_k} + I_i) - v'(1 - L_i - \frac{I_i}{p_k}) - \gamma = 0. \tag{18}$$

As L_i approaches zero, then the FOC (17) will be satisfied precisely at $\tilde{\tilde{I}}_i$. For strictly positive wage employment supply, (17) defines the equilibrium wage employment supply function, $L_i^* = L_i^*(w, r_i, I_i)$. Totally differentiating this it is straightforward to show,

$$\frac{dL_i^*}{dr_i} = -\frac{w\frac{I_i}{p_k}u''(wL_i + r_i\frac{I_i}{p_k} + I_i)}{[w^2u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + v''(1-\frac{I_i}{p_k} - L_i)]} < 0, \tag{19}$$

$$\frac{dL_i^*}{dI_i} = -\frac{\left[w\left(\frac{r_i}{p_k}+1\right)u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + \frac{1}{p_k}v''(1-\frac{I_i}{p_k} - L_i)\right]}{u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + v''(wL_i + r_i\frac{I_i}{p_k} + I_i)} < 0, \tag{20}$$

$$\frac{dL_i^*}{dw} = -\frac{\left[u'(wL_i + r_i\frac{I_i}{p_k} + I_i) + wL_i^*u''(wL_i + r_i\frac{I_i}{p_k} + I_i)\right]}{[w^2u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + v''(1-\frac{I_i}{p_k} - L_i)]}, \tag{21}$$

hence, $sign\left[\frac{dL_i^*}{dw}\right] = sign[u'(wL_i^*) + wL_i^*u''(wL_i^*)]$ that is positive if the substitution effect dominates, and negative if the income effect dominates. As the individual endowment tends to zero, the FOC for L_i reduces to $wu'(wL_i) - v'(1-L_i) = 0$. As the capital constraint binds, $S_i^* = \frac{I_i}{p_k}$, and so $\frac{dS_i^*}{dI_i} = \frac{1}{p_k} > 0$, as in Case (c).

This summarizes the four possible occupational choice combinations for individuals with a skill endowment such that $r_i > w$. To complete the characterization of the equilibrium, we consider the choices of those individuals for whom $r_i < w$. There are then two further cases to consider depending on the resource endowment of the individual.

Case (e): Suppose the individual finds it optimal not to engage in either occupational activity so $L_i^* = S_i^* = 0$. Then $\alpha \geq 0$ and $\beta \geq 0$ and the FOCs (4) and (5) apply. From (4), that is decreasing in I_i, we can then identify the unique threshold level of resource endowment at which the individual optimally starts to supply wage employment, $\hat{I}_i$, that is: $wu'(\hat{I}_i) - v'(1) = 0$. It is then straightforward to see that,

$$\frac{d\hat{I}_i}{dw} = -\frac{u'(\hat{I}_i)}{wu''(\hat{I}_i)} > 0. \tag{22}$$

Case (f): Now consider the case in which the individual supplies some strictly positive wage employment, and finds it optimal not to engage in self-employment so $L_i^* > 0, S_i^* = 0$ and $\alpha = 0, \beta > 0$ and $\gamma = 0$, so the FOCs reduce to,

$$wu'(wL_i + I_i) - v'(1-L_i) = 0, \tag{23}$$

$$r_iu'(wL_i + I_i) - v'(1-L_i) + \beta = 0. \tag{24}$$

From the first FOC for L_i its is straightforward to derive the properties of the labour supply function, $L_i^{**}(w, I_i)$.

$$\frac{dL_i^{**}}{dI_i} = -\frac{wu''(wL_i + I_i)}{w^2u''(wL_i + I_i) + v''(1 - L_i)} < 0, \tag{25}$$

$$\frac{dL_i^{**}}{dw} = -\frac{\left[u'(wL_i + I_i) + wL_i^{*}u''(wL_i + I_i)\right]}{\left[w^2u''(wL_i + I_i) + v''(1 - L_i)\right]}, \tag{26}$$

hence, $sign\left[\frac{dL_i^{**}}{dw}\right] = sign[u'(wL_i + I_i) + wL_i^{**}u''(wL_i + I_i)]$ that is positive if the substitution effect dominates, and negative if the income effect dominates. When $I_i = 0$ the FOC implies the same amount of wage employment is supplied as in Case (d) when $I_i = 0$. ■

Proof of proposition 2:

Part I: Effect on L.

1. Individuals for whom $w > r_{i1} > r_{i0}$ either specialize in wage employment or are out of the labour force. For these, the programme weakly reduces L through the wealth effect. In particular, individuals who were out of the labour force ($I_i > \tilde{I}$) stay out of the labour force. Individuals with ($\tilde{I}_i - A < I_i < \tilde{I}$) exit the labour force (labour hours drop by L^{**}) Individuals with ($\tilde{I} - A > I_i$) remain specialized in wage employment which falls according to $\frac{dL_i^{**}}{dI_i} = -\frac{wu''(wL_i + I_i)}{w^2u''(wL_i + I_i) + v''(1 - L_i)} < 0$.
2. Individuals for whom $r_{i1} > w > r_{i0}$ switch from wage employment to self-employment after the programme. Labour hours drop from L^{**} to 0 if $I_i > \tilde{\tilde{I}}_i$ and by $L^{**} - L^{*} > 0$ if $I_i \leq \tilde{\tilde{I}}_i$.
3. Individuals for whom $r_{i1} > r_{i0} > w$ experience no change in wage employment supply if they were not engaged in wage employment at baseline, that is if $I_i > \tilde{\tilde{I}}_i$. They experience a fall in wage employment if $I_i \leq \tilde{\tilde{I}}_i$. Indeed, as shown above $\frac{d\tilde{\tilde{I}}_i}{dr_i} < 0$, thus $\tilde{\tilde{I}}_i(r_{i1}) - A < \tilde{\tilde{I}}_i(r_{i0})$ and $dL^{*}/dI < 0$ (from (19)) $dL^{*}/dr < 0$ from ((18)).

This proves the first statement.

Part II: Effect on S

1. Individuals for whom $w > r_{i1} > r_{i0}$ do not experience any change in S, as they choose $S = 0$ before and after treatment.
2. Individuals for whom $r_{i1} > w > r_{i0}$ switch from wage employment to self-employment after treatment and experience an increase in S, the magnitude of which depends on which of cases (a)-(d) they are in as a function of I_i

3. The effect on individuals for whom $r_{i1} > r_{i0} > w$ depends on the relative size of the training and asset transfer effects. In particular:
   a. There exists a threshold $\overline{A}$ defined by $\tilde{I}(\overline{r_{i1}}) - \overline{A} = 0$ where $\overline{r_{i1}} = max_i(r_{i1})$, such that for all $A > \overline{A}$ self employment hours fall for all individuals. To prove this note that for $A > \overline{A}$, $\tilde{I}(r_{i1}) - \overline{A} < 0$ for all i, thus all individuals exit the labour force as a consequence of the programme and for all individuals previously choosing $S_i > 0$, self-employment hours fall. This proves part (i) of the proposition
   b. There exists a threshold $\underline{A}$ defined by the min $\{A_1, A_2\}$ where $\tilde{I}(r_{i1}) - A_1 = \tilde{I}(r_{i0})$ and $\tilde{\tilde{I}}(r_{i1}) - A_2 = \tilde{\tilde{I}}(r_{i0})$ such that for $A < \underline{A}$ self employment hours increase for all individuals. To prove this note that by definition if $A < \underline{A}$, $\tilde{\tilde{I}}(r_{i1}) - A > \tilde{\tilde{I}}(r_{i0})$ and $\tilde{I}(r_{i1}) - A > \tilde{I}(r_{i0})$ for all i, namely the threshold level of I below which the asset constraint binds and the level of I below which individuals participate in the labour force both shift to the right after treatment. Individuals then fall in one of the following five categories:
      - $I_i \leq \tilde{\tilde{I}}(r_{i0})$ - for these individuals the asset constraint binds before and after treatment and self employment hours are defined by the constraint $S_i^* = \frac{I_i}{p_k}$. Treatment relaxes the constraint by A and increases self-employment hours by the same amount;
      - $\tilde{\tilde{I}}(r_{i0}) < I_i \leq \tilde{\tilde{I}}(r_{i1}) - A$ - for these individuals the asset constraint did not bind before treatment but binds after treatment, hence, it must be that $S^*(r_{i1}, I_i + A) > \frac{I_i + A}{p_k} > \frac{I_i}{p_k} > S^*(r_{i0}, I_i)$, hence, self-employment hours increase from $S^*(r_{i0}, I_i)$ to $\frac{I_i + A}{p_k}$.
      - $\tilde{\tilde{I}}(r_{i1}) - A < I_i \leq \tilde{I}(r_{i0})$ - for these individuals the asset constraint does not bind and they stay in the labour force before and after treatment; self-employment hours are given by $S^*(r_{i1}, I_i + A)$ after treatment and $S^*(r_{i0}, I_i)$ before, point iii above shows that $S^*(r_{i1}, I_i + A) > S^*(r_{i0}, I_i)$
      - $\tilde{I}(r_{i0}) < I_i \leq \tilde{I}(r_{i1}) - A$ - for these individuals it is optimal to stay out of the labour force before treatment and to join after treatment; self-employment hours increase by $S^*(r_{i1}, I_i + A)$
      - $I_i > \tilde{I}(r_{i1}) - A$ - for these individuals it is optimal to stay out of the labour force before and after treatment. This proves part (ii) of the proposition.
   c. For intermediate values of A, such that $\tilde{I}(r_{i1}) - A > 0$ for some i so that after treatment some individuals stay in the labour force and either (c1) $\tilde{\tilde{I}}(r_{i1}) - A < 0$, i.e. no individual face a binding asset constraint or (c2) $\tilde{\tilde{I}}(r_{i0}) > \tilde{\tilde{I}}(r_{i1}) - A > 0$ and $\tilde{I}(r_{i0}) > \tilde{I}(r_{i1}) - A > 0$ namely fewer individuals face a binding constraint and fewer individuals participate in the labour force or (c3) $\tilde{\tilde{I}}(r_{i0}) > \tilde{\tilde{I}}(r_{i1}) - A > 0$ and $\tilde{I}(r_{i1}) - A > \tilde{I}(r_{i0}) > 0$ namely fewer individuals face a binding constraint and more individuals participate in the labour force– we can show that there is a threshold level of $\underline{I}$, such that self-employment hours unambiguously increase for all $I_i < \underline{I}$ whereas the effect is ambiguous for $I_i > \underline{I}$. For brevity we report the proof for case (c2) only, the other two cases are similar. It is straightforward to show that the

treatment increases self-employment hours for all $I_i < \underline{I}$ where $\underline{I} = \tilde{\tilde{I}}(r_{i1}) - A < \tilde{\tilde{I}}(r_{i0})$, indeed all the individuals who face a binding constraint before and after treatment will increase S from $\frac{I_i}{p_k}$ to $\frac{I_i + A}{p_k}$.

Next we show that for $I_i > \underline{I}$ the the treatment can increase or decrease self-employment hours. In particular for $I_i = \tilde{\tilde{I}}(r_{i1}) - A$, $S^*(r_{i1}, I_i + A) = \frac{I_i + A}{p_k} > \frac{I_i}{p_k}$, thus by continuity there is a range of I_i close to $I_i = \tilde{\tilde{I}}(r_{i1}) - A$ for which self-employment hours increase. At the other extreme, all individuals for whom $\tilde{I}(r_{i1}) - A < I_i < \tilde{I}(r_{i0})$ drop out of the labour force, reducing hours by $S^*(r_{i0}, I_i)$ after treatment. ■

Appendix B

Table B1. Determinants of non-attrition

Dependent variable=1 if respondent is surveyed in all three waves
Sample includes all eligible poor women at baseline
OLS estimates, standard errors clustered at the community level in parentheses

	(1) Treatment assignment	(2) Occupational choice at baseline	(3) Heterogeneous attrition by occupational choice at baseline
Treatment community	0.031	0.014	0.014
	(0.02)	(0.01)	(0.01)
Specialized in wage employment		0.033	0.011
		(0.02)	(0.01)
Specialized in self- employment		0.060***	0.049***
		(0.02)	(0.01)
Engaged in both occupations		0.051**	0.048***
		(0.02)	(0.01)
Treatment x specialized in wage employment			-0.037
			(0.03)
Treatment x specialized in self employment			-0.016
			(0.03)
Treatment x engaged in both occupations			-0.004
			(0.03)
Sub-district fixed effects	Yes	Yes	Yes
Adjusted R-squared	0.006	0.006	0.003
Observations (number of eligible poor women)	7953	7953	7953

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The dependent variable is a dummy variable equal to one if the eligible woman is observed in all three survey waves (baseline, midline, end line), and zero otherwise. All specifications control for the level effect of the treatment and subdistrict fixed effects. Standard errors are clustered at the community level.

Table B2. The impact of the ultra poor programme on the occupational choices and earnings of eligible women

Robustness check: allowing for differential time trends for women who are sole earners in the household
Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Occupational choice						Seasonality and earnings		
	(1) Specialized in wage employment (yes=1)	(2) Specialized in self-employment (yes=1)	(3) Engaged in both occupations (yes=1)	(4) Hours devoted to wage labour	(5) Hours devoted to self employment	(6) Share of activities held regularly	(7) Share of activities with seasonal earnings	(8) Total earnings	(9) Earnings per hour
Programme effect after 2 years	-0.160***	0.133***	0.133***	-88.580***	473.672***	0.187***	-0.017	1501.368***	-0.219
	(0.01)	(0.02)	(0.02)	(27.53)	(24.01)	(0.02)	(0.02)	(252.75)	(0.19)
Programme effect after 4 years	-0.178***	0.155***	0.084***	-187.861***	379.164***	0.178***	-0.088***	1637.642***	0.584***
	(0.02)	(0.02)	(0.02)	(28.72)	(23.42)	(0.02)	(0.02)	(253.27)	(0.20)
Mean of outcome variable in treated communities at baseline	0.257	0.303	0.264	646.7	421.81	0.478	0.674	4607.7	4.14
Two year impact = Four year impact (p-value)	.160	.164	.003	.000	.000	.545	.000	.635	.000
Adjusted R-squared	0.137	0.104	0.078	0.158	0.136	0.110	0.091	0.099	0.048
Number of eligible poor women	6732	6732	6732	6732	6732	6732	6732	6732	6732
Observations (clusters)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	18672 (1308)	18672 (1308)	20196 (1309)	18387 (1308)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves, subdistrict fixed effects, a dummy variable for whether the eligible woman is the sole earner in the household, and an interaction of survey waves with a dummy variable for the eligible woman being the sole earner. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. All variables are measured on an annual basis. All outcome variables are measured at the individual level (for the eligible woman in the household). All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.

Table B3. The impact of the ultra poor programme on the occupational choices and earnings of eligible women

Robustness check: using all poor in control communities as counterfactual
Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Occupational choice					Seasonality and Earnings			
	(1) Specialized in wage employment (yes=1)	(2) Specialized in self-employment (yes=1)	(3) Engaged in both occupations (yes=1)	(4) Hours devoted to wage labour	(5) Hours devoted to self employment	(6) Share of activities held regularly	(7) Share of activities with seasonal earnings	(8) Total earnings	(9) Earnings per hour
Programme effect after 2 years	-0.186***	0.143***	0.147***	-103.854***	521.818***	0.214***	-0.032**	1845.947***	-0.304*
	(0.01)	(0.01)	(0.01)	(21.49)	(22.15)	(0.01)	(0.02)	(220.81)	(0.18)
Programme effect after 4 years	-0.184***	0.172***	0.084***	-187.103***	400.580***	0.181***	-0.039**	1724.635***	0.560***
	(0.01)	(0.01)	(0.02)	(22.43)	(21.20)	(0.02)	(0.02)	(230.32)	(0.19)
Mean of outcome variable in treated communities at baseline	0.257	0.303	0.264	646.7	421.81	0.478	0.674	4607.7	4.14
Two year impact = Four year impact (p-value)	.797	.037	.000	.000	.000	.007	.688	.638	.000
Adjusted R-squared	0.061	0.064	0.074	0.055	0.115	0.068	0.082	0.085	0.051
Number of eligible poor women	10,904	10,904	10,904	10,904	10,904	10,904	10,904	10,904	10,904
Observations (clusters)	32712 (1387)	32712 (1387)	32712 (1387)	32712 (1387)	32712 (1387)	29831 (1386)	29831 (1386)	32712 (1387)	29831 (1386)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS, where we also include households classified to be near poor from the control communities. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves and subdistrict fixed effects. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. All variables are measured on an annual basis. All outcome variables are measured at the individual level (for the eligible woman in the household). All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.

Table B4. The impact of the ultra poor programme on the occupational choices of other members of eligible households

Difference in difference ITT estimates
Standard errors in parentheses clustered by community

	Husbands		Other adult members		Children	
	(1) Hours devoted to wage labour	(2) Hours devoted to self-employment	(3) Hours devoted to wage employment	(4) Hours devoted to self-employment	(5) Hours devoted to wage labour	(6) Hours devoted to self-employment
Programme effect after 2 years	-65.955	167.554***	-6.137	70.481***	5.225	56.635***
	(47.78)	(11.99)	(15.94)	(6.43)	(8.13)	(6.14)
Programme effect after 4 years	-83.775	58.656***	8.706	46.938***	1.124	35.891***
	(51.51)	(11.02)	(17.56)	(7.17)	(8.33)	(6.45)
Mean of outcome variable in treated communities at baseline	633.25	152.57	363.13	24.30	31.83	17.93
Two year impact = Four year impact (p-value)	.691	.000	.308	.000	.5739	.000
Adjusted R-squared	0.083	0.125	0.008	0.041	0.002	0.035
Number of eligible poor women	6732	6732	6732	6732	6732	6732
Observations (clusters)	11751 (1168)	11751 (1168)	20889 (1239)	20889(1239)	18922	18922 (1204)

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. The table reports ITT estimates based on a difference-in-difference specification estimated by OLS. The programme effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (end line) survey wave. All specifications control for the level effect of the treatment, survey waves and subdistrict fixed effects. Standard errors are clustered at the community level. At the foot of the table we report the mean of each dependent variable as measured at baseline in the treatment communities. We also report the p-value on the hypothesis test that the two and four year programme impacts are equal. The number of eligible poor women is the number of eligibles that are observed at least twice in each specification. All variables are measured on an annual basis. Outcome variables in Columns 1 and 2 refer to the husband of the eligible woman. Outcomes in Columns 3 and 4 are measured at the household level for all other adult household members (excluding the eligible woman and her husband). Outcomes in Columns 5 and 6 are measured at the household level for all children. All occupational hours variables are defined over the year prior to the baseline survey. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities.

Table B5. The economic lives of the eligible women at baseline, by treatment status and occupation

Columns 1A, 1B, 1C, 2A, 2B and 2C: means and standard deviation in parentheses
Columns 3A, 3B and 3C: difference in means and standard errors in parentheses, clustered by community
Columns 4A, 4B and 4C: normalised difference of means

	Panel A: Specialised in wage labour at baseline				Panel B: Engaged in both occupations at baseline				Panel C: Specialised in self-employment at baseline			
	(1A) Treated communities	(2A) Control communities	(3A) Raw differences	(4A) Normalised differences	(1B) Treated communities	(2B) Control communities	(3B) Raw differences	(4B) Normalised differences	(1C) Treated communities	(2C) Control communities	(3C) Raw differences	(4C) Normalised differences
A. Household characteristics												
Primary female is the sole earner (yes=1)	.570	.606	-.036	-.052	.410	.501	-.091***	-.130	.287	.369	-.082	-.124
	(.495)	(.489)	(.025)		(.492)	(.500)	(.025)		(.452)	(.483)	(.024)	
Primary female is literate (yes=1)	.037	.023	.014*	.056	.037	.056	-.020*	-.066	.103	.104	-.001	-.003
	(.188)	(.150)	(.008)		(.188)	(.231)	(.010)		(.304)	(.305)	(.015)	
Household owns livestock (yes=1)	.150	.142	.008	.016	.724	.718	.006	.009	.742	.724	.018	.029
	(.357)	(.349)	(.022)		(.447)	(.450)	(.025)		(.438)	(.447)	(.024)	
Value of livestock owned (Takas)	151	95.9	55.1	.044	1263	1335	-72.4	-.013	1771	1648	123	.019
	(1104)	(607)	(42.2)		(3721)	(4131)	(219)		(4843)	(4456)	(251)	
Total per capita expenditures (Takas)	10411.95	9656.88	755.069***	.103	10103.29	10119.98	-16.69	-.002	9565.14	9571.79	-6.65	-.001
	(5167.35)	(4675.469)	(255.49)		(4429.80)	(5163.72)	(273.99)		(3874.65)	(4605.7)	(221.68)	
B. Individual occupational choice												
Hours devoted to wage employment	1385	1533	-148***	-.142	1101	1254	-154	-.161	-	-	-	-
	(741)	(730)	(43.0)		(654)	(697)	(40.2)					
Hours devoted to self-employment	-	-	-	-	577	560	17.1	.030	889	925	-36.6	-.036
					(401)	(402)	(22.6)		(720)	(716)	(39.2)	
Share of income generating activities held regularly	.189	.232	-.043**	-.081	.430	.413	.016	.042	.747	.719	.028	.050
	(.360)	(.391)	(.021)		(.266)	(.284)	(.016)		(.403)	(.403)	(.023)	
Share of income generating activities with seasonal earnings	.850	.848	.002	.004	.668	.674	-.005	-.013	.540	.461	.079	.125
	(.329)	(.328)	(.021)		(.294)	(.294)	(.019)		(.458)	(.444)	(.027)	
Earnings per hour	5.67	5.09	.582***	.101	4.36	4.91	-.552	-.126	2.50	2.61	-.116	-.019
	(4.49)	(3.61)	(.215)		(2.84)	(3.32)	(.190)		(4.48)	(4.35)	(.218)	

Notes: *** (**) (*) indicates significance at the 1% (5%) (10%) level. All data refers to the baseline survey. The panels of the table split eligible women into their occupational choices at baseline. Panel A refers to those that were specialized in wage labour; Panel B refers to those that were engaged in both wage and self employment activities at baseline; Panel C refers to those that were specialized in self-employment at baseline. Columns 1A, 1B and 1C report statistics based on eligibles in treatment communities; Columns 2A, 2B and 2C report statistics based on eligibles in control communities. Columns 3A, 3B and 3C report the difference in means and its standard error clustered at the community level. Columns 4A, 4B and 4C report

normalized differences computed as the difference in means in treatment and control communities divided by the square root of the sum of the variances. The upper panel of the table (Panel A) refers to household characteristics and Panel B refers to characteristics of the lead woman in each household. Total per capita expenditures equals expenditure over the previous year (on food and non-food items) divided by adult equivalents in the household. The adult equivalence scale gives weight 0.5 to each child younger than 10. All occupational choice variables are defined over the year prior to the baseline survey. The woman is defined to be specialized in wage labour (the dummy equals one) if the individual only engages in income generating activities where they are employed by others. A woman is defined to be specialized in self-employment activities (the dummy equals one) if the individual only engages in income generating activities where they are self-employed. Hours spent in self-employment are measured by multiplying the number of hours worked in a typical day by the number of days worked in a year for each self-employment activity and then summing across all self-employment activities. Hours spent in wage employment are similarly computed by multiplying the number of hours worked in a typical day by the number of days worked in a year for each wage labour activity and then summing across all wage labour activities. Earnings per hour are calculated as total earnings divided by total hours worked in all income generating activities. The share of income generating activities held regularly equals the fraction of income generating activities the individual engaged in more than 300 days per year. The share of income generating activities with seasonal earnings equals the fraction of income generating activities whose earnings fluctuate over the course of the year. In 2007, 1USD=69Tk.