CAN BASIC ENTREPRENEURSHIP TRANSFORM THE ECONOMIC LIVES OF THE POOR?*

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Abstract

The world's poorest people lack capital and skills and toil for others in occupations that others shun. Using a large-scale and long-term randomized control trial in Bangladesh this paper demonstrates that sizable transfers of assets and skills enable the poorest women to shift out of agricultural labor and into running small businesses. This shift, which persists and strengthens after assistance is withdrawn, leads to a 38% increase in earnings. Inculcating basic entrepreneurship, where severely disadvantaged women take on occupations which were 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, vocational training, occupational choice, structural change, poverty.

JEL Classification: O12; I30; D50.

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1 Introduction

The world's poorest people lack both capital and skills. They tend to engage in low-skilled wage labor activities that are insecure and seasonal in nature [Banerjee and Duflo 2007].[1] The non-poor, in contrast, tend to be engaged in secure wage employment, or employ others in the 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 and to understand how this process is linked to a paucity of capital and skills.

Economic theory highlights mechanisms via which expanded access to capital enables individuals to alter their occupational choices and exit poverty [Banerjee and Newman 1993, Besley 1995, Galor and Zeira 1993, Gine and Townsend 2004, Aghion *et al.* 2005, Jeong and Townsend 2008, Karlan and Morduch 2010, Townsend 2011, Buera, Kaboski and Shin 2012] and how limited human capital formation constrains occupational choices and the ability to escape poverty [Becker 1964, Schultz 1961, 1980, Strauss and Thomas 1995, Behrman 2010]. In line with this, many antipoverty programs target either a lack of capital, for instance through microfinance, development banking or asset transfer programs, or a lack of skills, for instance through vocational training or cash transfers conditioned on school attendance. Whether these programs can permanently transform the lives of the poor crucially depends on the existence and strength of the causal link between the lack of capital and skills and occupational choice and poverty.

Although there is a distinguished and growing literature in macroeconomics that documents how occupational change and aggregate development proceed together [Kuznets 1966; Chenery and Syrquin 1975, Murphy, Shleifer and Vishny 1989, Caselli and Coleman 2001, Ngai and Pissarides 2007, Buera and Kaboski 2012], far less is known about whether policy interventions that transfer capital and skills are capable of bringing about structural transformation through occupational change.[2] This paper attempts to partly fill the gap between studies of occupational change driving economic development that concern macroeconomists, and microeconomic work evaluating programs 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 laborers into manufacturing and service sector jobs in cities.[3] We ask whether tackling both

[1] Agricultural laborers, which often constitute the bottom stratum of society in developing countries, are confronted not only with seasonal and weather-dependent demand for their labor but also with barriers to other forms of employment owing to their limited capital and skills [Sen 1981, Dreze and Sen 1989].

[2] There are of course reasons to be skeptical about whether antipoverty programs 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 human capital if the returns 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 [Schoar 2009]. Self-control or other behavioral biases my 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, social norms and rules might constrain occupational choices, especially of women [Field *et al.* 2010].

[3] *In situ* occupational change involving modest changes in the activities of poor rural citizens, sometimes referred

capital and skills constraints *simultaneously* by providing business asset transfers coupled with complementary and intensive training, can transform the economic lives of some of the world's poorest people.

To answer this question, we collaborated with the NGO BRAC to implement a large-scale and long-term randomized control trial to evaluate their Targeted Ultra-Poor (TUP) program in rural Bangladesh. Eligible women - identified to be the very poorest in these rural communities[4] - are offered a menu of possible business activities, ranging from livestock rearing to small retail operations, coupled with complementary and intensive training in running whichever business activity they choose.[5] The scale of the program combined with the size of the transfers implies that, taken as a whole, the TUP program 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 program was already reaching close to 400,000 women and a further 250,000 will reached between 2012 and 2016.[6] The program gives a big push to relaxing both capital constraints (at $140 the value of the asset transfer is worth roughly ten times baseline livestock wealth) and skills constraints (the value of the two-year training and assistance which women receive is of a similar magnitude). This is done in a context where eligible beneficiaries are unable to relax these constraints through the market. For capital, the value of microfinance loans available to them is too low to finance such large purchases and repayment requirements too stringent to allow them the time to generate income from a new enterprise. For skills, training programs are not available and informal arrangements might not be sufficient to deliver all the assistance required to operate the small businesses that women select.

In our pre-program setting, the rural poor are faced with a choice between wage employment (mainly as agricultural laborers and domestic servants) and self-employment (mainly in livestock rearing). The program influences this choice by increasing wealth via the asset transfer and the returns to self-employment via skills training. We develop a simple model to understand the occupational choices that targeted poor women make at baseline and how the program affects

to as subsistence entrepreneurship, can play a major role in poverty reduction. This 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 but tend to be located in urban areas and are therefore not the focus of this study.

[4]Women are selected on criteria such as not owning land, not having a male adult earner in the household, having to work outside the household, having school-aged children that work and having no productive assets. Eligibles must also not be enrolled with microfinance organizations or recipients of government anti-poverty programs.

[5]The majority choose high value livestock businesses which had been mainly operated by non-poor women in the communities we study. In value, scale and complexity these businesses were distinct from the more basic livestock rearing that some poor women were engaged in before the program (e.g. cow rearing versus free range poultry).

[6]In Bangladesh the TUP program is know as the specially targeted ultra poor program. Another variant, known as the other targeted poor program (OTUP), targets slightly less disadvantaged women with the asset transfer being purchased using a BRAC loan. This variant reached 600,000 beneficiaries in 2011 and will reach a further 150,000 by 2016 [BRAC 2011]. Non experimental evaluations of the program are reported in Ahmed *et al.* [2009] and Emran *et al.* [2009], tracking 5000 households from 2002 to 2005. Both studies find positive impacts on per capita consumption and improvements in food security. Das and Misha [2010] extend the panel to 2008 and find positive impacts on income, food security and asset holdings.

these choices on the extensive and intensive margins of labor supplied to each activity. This shows that both asset transfers and skills provision components reduce hours devoted to wage employment, through income and substitution effects. On hours devoted to self-employment, the model shows how the effect of both components is heterogeneous depending on whether individuals face a binding capital constraint at baseline. In particular, asset transfers can have the unintended consequence of reducing hours devoted to self-employment through a wealth effect. Ultimately the model shows that the effect of the program 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 program officers select potential beneficiaries in 2007 following the same selection criteria in treatment and control communities. We survey and track *all* poor households (both eligibles and non-eligibles), as well as a 10% random sample of non-poor households from across other wealth classes in the same treated and control communities. We identify the effect of the program by a difference in difference estimate that compares the outcome of the eligible poor in treated versus control communities before and after program implementation. Given that we sample households from across the wealth distribution, we benchmark these estimated impacts against the baseline gap between eligible and non-poor households.

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 program's implementation. This helps trace out the economic trajectories of poor women over an extended period, shedding light on whether the labor productivity of poor women improves over time as they become more adept at running their new businesses. This time scale also means that we move well beyond the period when targeted women are receiving direct assistance from BRAC.

The data confirm that the program 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. 80% of them live below the global poverty line (US$1.25). They typically engage in multiple occupations, which are not held regularly throughout the year and characterized by income seasonality. The precariousness of their economic lives though striking, is typical of the situation that millions of rural women across the developing world find themselves in.[7] 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.

Our estimates of the program's impact show evidence of a causal link from the lack of capital and skills to occupational choice, and ultimately poverty and insecurity. We find that, on the extensive margin, after four years the TUP program reduces the share of women specialized in

[7] It is well documented that landless agricultural laborers, 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 labor in the pre-harvest period.

wage employment 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 labor supply increases by an additional 218 hours which represents an increase of 19% relative to baseline. Given the occupational change induced, their labor supply becomes more regular throughout the year, while income seasonality is reduced. The change in occupational structure is associated with a 15% increase in labor 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. Benchmarked against the global poverty line of \$1.25 per day and recalling that the average eligible lives on 93c per day at baseline, the program lifts 11% of the eligible women out of extreme poverty. Measures of estimated effects are typically more pronounced after four relative to after two years, indicating that the program sets beneficiaries on a sustainable path out of poverty.

To probe further whether all eligible women are equally impacted, we estimate quantile treatment effects. These 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 program increases both the mean and the dispersion of total earnings among the treated. Second, benchmarking the magnitude of the program 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; and (ii) they close around 40% of the gap to middle class households on metrics related to occupational choice and earnings.

What we observe, therefore, is significant occupational change and a rich set of social dynamics within these rural communities. Large transfers of capital and skills catapults some of most disadvantaged women in the world into labor activities which had been the preserve of non-poor women in the communities they share. Occupational change, which reflects itself in higher and less volatile earnings streams, sets these women on a sustainable path out of poverty. On many margins the program brings their economic lives closer to the middle classes in their communities. The paper thus joins the macro and micro literatures by pointing to some concrete evidence on how occupational change can be engineered in the rural settings where the bulk of the world's poorest people live.

The TUP program is now being piloted in many countries.[8] This scale-up is critical to as-

[8] As of March 2013, ten different pilots were active around the world, http://graduation.cgap.org/pilots/. BRAC is piloting the program in both Afghanistan and Pakistan. Other pilots are being carried out in Andhra Pradesh,

certaining whether TUP-style programs can be used to fight poverty on a global scale. Findings from a pilot in West Bengal are consistent with ours: Banerjee *et al.* [2011] report impacts on consumption expenditures, earnings and food security which are of similar magnitude to those we report. However, Morduch *et al.* [2012] find that a pilot in Andhra Pradesh has weak impacts on earnings and consumption. This is due, in part, to the fact that the Government of Andhra Pradesh simultaneously introduced a guaranteed-employment scheme that substantially increased earnings and expenditures for wage laborers. Our theoretical framework makes precise how such outside options in wage labor are obviously important determinants of whether TUP-style programs induce occupational change towards basic entrepreneurship, and we discuss our empirical findings relative to these pilot studies throughout.

The paper is organized as follows. Section 2 develops a framework that highlights the main channels through which the TUP program impacts occupational choices. Section 3 describes the program, our research design and data. Section 4 presents our core results that closely map to the model developed on occupational choice, earnings and labor productivity. Section 5 documents the impacts on other margins, heterogeneous impacts, and benchmarks the impacts vis-à-vis baseline differences in outcomes between eligibles and other wealth classes. Section 6 conducts a cost benefit analysis of the program, comparing it to the counterfactual policy of unconditional cash transfers. Section 7 concludes. All proofs and robustness checks are in the Appendix.

2 Theoretical Framework

We model how the poor allocate their time between leisure and the two occupations most common in our setting: wage employment and self-employment. The model makes precise how the program impacts equilibrium occupational choices through asset transfers, that boost wealth endowments, and 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 labor to supply to each occupation on the intensive margin. We assume the time devoted to occupational activities is 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 labor market receiving an return w per unit of time, so earnings from wage employment are wL_i.[9] Time devoted to self-employment (S_i) is combined

Ethiopia, Ghana, Haiti, Honduras, Pakistan, Peru and Yemen by other organizations.

[9]We rule out the possibility that labor can be hired in, which is an accurate empirical description for the eligible poor individuals we focus on. For expositional ease, we also abstract from skill differences in the labor market and assume w is the same for all individuals. This reflects the fact that the study population is mostly unskilled and supplies labor in two competitive wage labor markets: for agricultural casual laborers and for domestic servants. The model predictions regarding the program impacts on the treated poor are robust to individuals earning

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 labor 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 eggs produced 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 revenues minus costs, that is $\pi_i = p_y f(\theta_i, K_i, S_i) - p_k K_i$.

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 to finance 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 microloans are insufficient to allow them to purchase lumpy livestock assets. Assuming less severe forms of credit market imperfections would yield similar results.

This minimalistic set-up is designed to starkly illustrate the two main forces at play: wealth effects due to the asset transfers and substitution effects due to training. To do so we abstract from features that could also affect occupational choice but are not directly affected by the program. Most notably in this context demand for wage labor exhibits strong seasonality so that L is constrained by this and the constraint might be binding at zero in some periods of the year. Modeling this explicitly would not affect the predicted effect of the program on occupational choice. Seasonality, however, has implications for the empirical comparison of w and r as the observed wage is effectively available only for part of the year while income from self-employment (e.g. through the sale of livestock produce) is more stable through the year.

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 labor force participation and whether the assets constraint binds when the individual chooses to engage in self-employment. Substituting C_i from the budget constraint yields the Lagrangian:

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

where α and β are the multipliers associated with the non-negativity constraints on time devoted

different wages. Any predictions regarding the general equilibrium effect of the program on wages and the pecuniary externalities on non-treated individuals (that are examined in more detail in Bandiera *et al.* 2013), would however depend on the skill distribution in the two populations and the degree of substitutability between skills.

to wage and self-employment and γ is the multiplier associated with the assets constraint. All multipliers 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.[10] 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:
(i) out of the labor force if: $r_i > w$ and $I_i \geq \tilde{I}_i(r_i)$; or $r_i < w$ and $I_i \geq \hat{I}_i(w_i)$
(ii) engaged solely in self-employment if: $r_i > w$ and $I_i \in [\tilde{\tilde{I}}_i(r_i, w),\ \tilde{I}_i(r_i))$;
(iii) engaged in both occupations if: $r_i > w$ and $I_i \leq \tilde{\tilde{I}}_i(r_i, w)$;
(iv) engaged solely in wage employment if: $r_i < w$ and $I_i < \hat{I}_i(w_i)$

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 labor supply functions ($L_i^*(.)$, $S_i^*(.)$). The proof of Proposition 1, provided in the Appendix, 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 labor supply functions, and their comparative statics with respect to wages, returns to self-employment and resource endowments.

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 labor force (case (i), 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 asset constrained and so, because we are considering the scenario where $r_i > w$, engage *solely* in self-employment (case (ii), where $L_i^* = 0$, $S_i^* > 0$ for $I_i \in [\tilde{\tilde{I}}_i(r_i),\ \tilde{I}_i(r_i))$). For these individuals the number of hours devoted to self-employment is decreasing in I because of the income effect. The next group of individuals also engage solely in self-employment but are asset constrained and so limited in scale by their endowment, $p_k K_i = I_i$ (case (ii), where $L_i^* = 0$, $S_i^* > 0$ for $I_i \in [\tilde{\tilde{I}}_i(r_i, w),\ \tilde{\tilde{I}}_i(r_i))$). 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 (iii), where $L_i^* > 0$, $S_i^* > 0$ for $I_i \leq \tilde{\tilde{I}}_i(r_i, w)$).[11] For these individuals the number of hours devoted to self-employment is increasing in I because an increase in I relaxes the binding asset constraints thus

[10] The assumption of Leontief technology is made for expositional convenience to keep track of either the amount of self-employment S_i or the amount of capital K_i. Allowing some degree of substitutability between these factor inputs would not alter the qualitative nature of the trade-offs identified.

[11] 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 diversifying economic activities, such as spreading risk. We focus on asset constraints as being an important driver of occupational choice as this margin is directly impacted by the TUP program. Other factors driving occupational diversification such as risk aversion are not impacted so are less relevant for understanding the *changes over time* that we exploit between treatment and control communities.

allowing individuals to increase the scale of their self-employment business and hence devote more hours to it.

Figure 1B shows the pattern of equilibrium occupational choices and corresponding labor supplies when $r_i < w$ (in the proof we derive the relevant endowment threshold, $\hat{I}_i(w_i)$). In this scenario, no individual specializes in self-employment and so the assets constraint plays no role in determining occupational choice. Figure 1B shows that individuals with sufficiently high resource endowments optimally choose to stay out of the labor force (case (i), 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 (iv), 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 occupation choices at baseline. As is empirically validated below, at baseline we observe a wide range of occupational choice allocations among the poor, ranging from those engaged solely in wage labor or solely self-employment, those engaged in both, and those out of the labor force. Figures 1A and 1B also highlight the comparative static properties of the wage and self employment labor supply functions with respect to wage rates, returns to individual skills, and resource endowments: these last two channels are the mechanisms through which the TUP program impacts occupational choices.

2.3 The Impact of the Ultra-Poor Program on Occupational Choices

The TUP program 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 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 $r_{i1} > r_{i0}$.[12]

As Figure 1A makes clear, asset transfer impacts the extensive and intensive margins of occupational choice by causing individuals to cross the various resource thresholds($\tilde{I}_i(r_i)$, $\tilde{\tilde{I}}_i(r_i)$, $\tilde{\tilde{\tilde{I}}}_i(r_i, w)$). Figure 2A shows the impact of the program *solely* though the asset transfer channel (assuming $r_i > w$), where the baseline wage and self-employment labor supplies are dashed lines, and the post-intervention labor supplies are solid lines. The left side of Figure 2A shows that individuals with the smallest resource endowments at baseline remain engaged in both wage and self-employment

[12] 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 labor to tend to it, which would have the same effect on I_i and occupational choice. We later provide evidence that almost no individuals 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' labor 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-labor income available to the woman. In line with this, we empirically document that the husbands' labor supply does not decrease following the implementation of the program. Third, the program 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 program has little impact on the price of livestock assets, p_k. Hence skill changes induced by the program translate into changes in the self-employment outcome $r_i = p_y\theta_i - p_k$ if the price of livestock produce, p_y, does not fall by sufficiently to offset any increase in θ_i.

activities although their time allocation shifts towards self-employment. The impact on the total hours they devote to work, $L_i^*(.) + S_i^*(.)$, is ambiguous.

The middle of Figure 2A shows that among individuals that were initially engaged solely in self-employment, labor hours might rise or fall depending on the initial resource endowment of the individual. Among those who were asset constrained at baseline, self-employment hours rise, all else equal. However, the framework makes clear that for those who were unconstrained at baseline, the asset transfer will actually *reduce* hours of self-employment (and total hours devoted to labor market activities) because of the income effect. Finally, the right hand side of Figure 2A shows that asset transfers alone cause more individuals to stop working.

The skills provision component of the program also shifts the wage and self-employment labor supply functions ($L_i^*(.)$, $S_i^*(.)$). Figure 2B shows the impact of the program solely though the skills provision channel (assuming $r_i > w$), where the baseline wage and self employment labor supplies are dashed lines, and the post-intervention labor supplies are solid lines. Figure 2B shows that among individuals initially engaged in self-employment, self-employment hours do not change unless the individual 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 labor hours because of the increased returns generated when they engage in self-employment. For these individuals total work hours unambiguously fall. The combined effect of asset transfers and training can be thus summarized as;

Proposition 2: If $r_i > w$ the TUP program 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 where 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 framework thus makes precise that both program components, 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. In contrast, 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 individuals constrained at baseline; skills provision has this desired impact on the intensive margin but only among those individuals unconstrained at baseline. The combined effect of the asset transfer and skills training on occupational choices then depends on initial resource endowments and the relative strength of the two effects shown in Figures 2A and 2B.

The proof is in the Appendix, where we compute the thresholds for cases (i)-(iii) as a function

of the two program components. The importance of accurately targeting the program to achieve its desired impacts is put sharply into focus if we consider the remaining case where when $r_i < w$, shown in Figure 2C. None of these individuals specializes 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 programs will have the desired impact of shifting these wage laborers into self-employment. Other things equal, asset transfers targeted towards these individuals will generate an income effect that reduce hours worked and labor force participation without affecting occupational choice.[13]

The remainder of the paper empirically measures these combined impacts of the TUP program on the extensive and intensive margins of wage employment and self-employment.

3 The Ultra-Poor Program, Evaluation Design and Data

3.1 The Program

The TUP program offers eligible women a menu of possible business activities, ranging from livestock rearing to small retail operations, coupled with complementary and intensive training in running their chosen business activity.[14] All eligible women in our sample chose one of the six available livestock packages, which contain different combination of animals (e.g. two cows or a cow and five goats) similarly valued at TK9500 (US$140). Given that the median household had no productive assets at baseline, this represents an enormous change in the resource endowment of households, which could fundamentally impact occupational choice as is illustrated in Figure 2A. BRAC encourages program recipients to commit to retain the asset for two years, after which they can liquidate it. Given that such commitments cannot be enforced, whether the livestock asset is retained or liquidated (particularly after four years) is itself an outcome of interest that ultimately determines whether the program has the desired effect of permanently transforming the occupational choices and economic lives of the poor, or merely increases their short run welfare.[15]

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

[14] The program also provides a subsistence allowance to beneficiary women for the first 40 weeks after the asset transfer to compensate them for the short-run fall in earnings due to occupational changes away from wage labor and into self-employment. 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.

[15] Morduch *et al.* [2012] report that in Andhra Pradesh, almost 90% of households opt for livestock related asset transfers from the wide ranging menu offered, but that many immediately liquidated the assets in order to pay off debts. The evidence from the TUP-style program in West Bengal in Banerjee *et al.* [2011] is inconclusive as to whether the liquidation of transferred assets played an important role in income increases experienced by eligible households.

The training component comprises initial classroom training at BRAC regional headquarters, followed up by regular assistance: a livestock specialist visits beneficiaries every one to two months for the first year of the program, and BRAC program officers visit beneficiaries weekly for the first two years. Training is meant to increase in the returns to self-employment, the implications of which are shown in Figure 2B. In particular, training is designed to help women maintain livestock health, maximize livestock productivity through best practices relating to feed and water, learn how to best inseminate animals to produce offspring and milk, rear calves, and to bring produce to market. Relative to many skills provision programs, this training is intensive and sufficiently long-lasting to enable women to learn how to successfully rear livestock through their calving cycle and across seasonal conditions.

Eligible women are selected by BRAC officers from the list of poor households compiled by community members through a participatory wealth ranking.[16] Communities are self-contained within-village clusters of 84 households on average. Our sample contains 1409 communities, where we survey all eligible and poor households, and a 10% random sample of households from higher wealth classes, which we later use to benchmark the size of the program's impact.

3.2 Evaluation and Data

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

$$y_{idt} = \alpha + \sum_{t=1}^{2} \beta_t W_t T_{id} + \gamma T_i + \sum_{t=1}^{2} \delta_t W_t + \eta_d + \epsilon_{idt}, \tag{2}$$

where y_{idt} is the outcome of interest for individual i in subdistrict d at time t, where the time periods refer to the 2007 baseline ($t = 0$), 2009 midline ($t = 1$) and 2011 endline ($t = 2$) survey waves. W_t are indicators for survey waves. All monetary values are deflated to 2007 prices using the Bangladesh Bank's rural CPI estimates. To evaluate the program's impact on occupational choice, we collect detailed information on all income generating activities of each household member during the previous year. 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

[16] To identify the communities where the program operates, BRAC central office first selects the most vulnerable districts in rural Bangladesh based on the food security maps of the World Food Program; and then BRAC employees from local branch offices within those districts select the poorest communities in their branch. Communities are then asked to rank all households into five wealth bins. Evidence from a randomized evaluation of different targeting methods, Alatas *et al.* [2011], shows 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. To identify eligibles among those ranked poor by their communities BRAC uses three binding exclusion criteria: (i) already borrowing from an NGO providing microfinance, (ii) receiving assistance from government anti-poverty programs, (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) adult women in the household work outside the homestead; (iv) school-aged children have to work; and (v) the household has no productive assets.

previous year, wage rates, earnings, and whether earnings varied throughout the year. From this data we build a complete picture of each individual's occupational choice, labor supply, earnings, and earnings volatility by economic activity, where all activities can be classified as being a form of wage labor (L_i) or self-employment (S_i).

We randomly select one or two sub-districts (upazilas) from each district where the program operates. Within each of the 20 subdistricts we then randomly assign one BRAC branch office to treatment (to receive the program in 2007) and one to control (to receive the program in 2011). Each branch office is responsible for the provision of BRAC services to communities in its area, so $T_{id} = 1$ if individual i lives in a treated community and 0 otherwise. η_d are subdistrict fixed effects and are included to improve efficiency because the randomization is stratified by subdistrict [Bruhn and McKenzie 2009].[17] For robustness we also allow for trends to differ by sub-district and all findings are quantitatively and qualitatively unchanged.

The program impact, β_t, is identified by comparing changes in individual outcomes among eligibles before and after the program 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 intent to treat parameter, which is close to the average treatment on the treated effect as 87% of selected eligibles take-up the offer to receive the program. 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.

β_t identifies the causal effect of the program under the twin assumptions of parallel trends in the outcomes of interest within subdistrict, and of no contamination between treatment and control communities. In this regard, three features of the research design are of note. First, eligible women are identified in the same way in both treatment and control communities using the combination of participatory wealth ranking and BRAC eligibility criteria described above. 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 programs targeted to eligible households in treatment or control locations, nor is participation to the TUP program conditional on joining other BRAC activities. Second, to ensure our estimates are not contaminated by anticipation effects, eligible women are informed of their eligibility status only when the program

[17] The average subdistrict has an area of approximately 250 square kilometers (97 square miles) and constitutes the lowest level of regional division within Bangladesh with administrative power and elected members. 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 on treatment and one control branch without stratifying by subdistrict.

starts operating in their community, that is after the baseline survey in treatment communities and after the endline survey in control communities. Third, using BRAC branches rather than communities as the unit of randomization minimizes the risk of contamination, both because communities within the same branch office are geographically closer to each other (in contrast, the average distance between branches is 12km), and because this minimizes the risk that program officers, who are based at a specific branch office, do not comply with the randomization.

At baseline, our evaluation sample contains 7953 eligible women 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 endline, 13% of eligible households attrit.[18] Table A1 estimates the probability of not attriting as a function of treatment status and baseline occupational choice, 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 labor) are 6pp more likely to be surveyed in all three waves compared to women who were out of the labor force at baseline. Women engaged solely in wage labor are equally likely to attrit. Third, and most important, there is no differential attrition by baseline occupational choices between treatment an control communities. The coefficients of the interaction terms between treatment status and occupational choice are all precisely estimated and close to zero. This suggests the program itself does not affect the probability that respondents drop out of the sample (which is most likely due to migration). 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 working sample thus contains 6732 eligible beneficiaries and 16,297 households from other wealth classes.

4 Main Results

4.1 Economic Lives at Baseline

Table 1 presents descriptive evidence on the characteristics of eligible women and their households and how they 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 shows that eligible women are more likely to be sole earners (38% are) in their households, less likely to be literate (only 7% are) and to own livestock (only 48% do). The asset holdings of eligible households, whether in livestock or land, are negligible

[18] This attrition rate is comparable to those in other evaluations of TUP-style programs: 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 endline survey). Morduch *et al.* [2012] find that of 1064 households surveyed at baseline in Andhra Pradesh, 12% attrit over a three year period.

and their per capita expenditure lies below that of near poor, middle and upper class households. Based on all these metrics, the TUP program does appear to successfully target the very poorest women (and their households) in these rural communities.[19] Expenditure levels are low, using PPP exchange rates (29TK=1US$), the average beneficiary lives on 93c per day, and 80% of the eligible women live below the global poverty line of US$1.25 a day. Table 1 also illustrates 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 and one third have expenditures below the global poverty line.

Panel B focuses on the occupational choices of the primary women in each household, by wealth class. To map to the occupational choice model, 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 laborer and domestic servant.[20] Within self-employment occupations, most individuals are engaged in livestock rearing and land cultivation.[21] To measure the total hours devoted to each occupation during the last year we multiply hours worked in a typical day by the number of days worked and sum within each employment type. 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 labor in agriculture, exhibit strong seasonality.

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 labor for others but rather devote effort to self-employment. 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. The data are thus consistent with the wealth ordering across occupational choices implied by the model. This holds both across classes, as described above, and within eligible women. Indeed, proxying resource endowments by household wealth

[19] This is in contrast to many poverty-alleviation government policies and some microfinance programs that have been found to mistarget the poorest households or be unable to retain them [Morduch 1998]. In our context, the fact that at baseline the average targeted poor own no livestock assets, particularly of the high value variety transferred by the program, suggests they also lack skills in how to rear livestock. Our evaluation sheds light on whether such skills can be imparted to these individuals.

[20] No other occupations apart from agricultural day laborer or domestic servant account for more than 5% of respondents. 38% of eligible women work solely as agricultural wage laborers, 43% work solely as domestic servants, and 10% do both. Of those working for daily wage spot contracts, 87% do so in agriculture. Among domestic servants, two factors point to these activities as not being stable forms of employment: (i) the median number of days worked per year in domestic service is 180, that is well below full employment; (ii) 86% of eligible women whose main occupation is domestic service (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.

(excluding land and livestock that are mechanically correlated with self-employment), we find that those solely engaged in wage employment own TK1319 of assets, those engaged in both wage and self employment activities own TK2995, and individuals solely engaged in self-employment own TK4050 worth of assets. All differences are precisely estimated at conventional levels.

Wage employment is less regular and exhibits more earning seasonality than self-employment. Among eligible women, 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. It is well documented that landless agricultural laborers, 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]. Relative to other women in these communities, targeted poor women are far more reliant on wage employment as opposed to self-employment, and thus are more exposed to seasonality.

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 normalized differences below .25 imply linear regression methods are unlikely to be sensitive to specification changes.

The one difference of note is that the share of women who are sole earners and hours devoted to wage employment is higher in control communities. 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 program effects are not contaminated by the fact that the occupational choice of sole earners follows a different trend, the Appendix 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 of poor women in control communities, namely including those who the *community* ranked as poor but BRAC officials deemed ineligible for the TUP program, as a control group.

4.2 Occupational Choice, Earnings and Labor Productivity

The TUP program is designed to promote occupational change at the bottom of the wealth distribution. This is what distinguishes it from most programs that focus on improving skills or access to capital for poor individuals who remain in a given occupation. It is in this sense that it can be described as an attempt to transform the economic lives of the poor. The core findings on whether this attempt 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 labor force) is similar in treatment and control communities. Two years later, all the eligible women in treated communities were in the labor 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 program's initiation, reveals that the significant changes in the occupational choices of the targeted poor achieved two years after program 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 that the natural pace of occupational change is painfully slow in the rural communities we study. [22]

Table 3 reports the ITT impact estimates of the TUP program from specification (2), and shows the parameters of interest, β_1 and β_2, measuring the ITT impacts two and four years after baseline respectively. The foot of the table shows the p-value on the null that $\beta_1 = \beta_2$, so we can assess the dynamic responses of individuals and households along each outcome margin. As described in Section 3.1, households are not obliged to retain the asset two years into the program, and the intensive training provided also terminates by two years. Hence the comparison of the two and year four program impacts is indicative of whether the program 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 program delivery from BRAC ends. To benchmark the magnitude of each impact, the foot of the table also shows the mean of the outcome variable at baseline in 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 program ITT impacts on the extensive and intensive margins of

[22] This is in sharp contrast to the setting in Morduch *et al.* [2012] who find no impacts of an TUP-style program in Andhra Pradesh. They highlight that key to understanding this divergence in results, is that in Andhra Pradesh, wage labor opportunities on government programs were dramatically improving over the study period, and the rural economy was characterized by a growing movement of labor away from self-employment opportunities and into government guaranteed wage labor schemes. As such, the introduction of an TUP-style program was very much fighting against such trends, and any gains caused by the program were offset by lost wage labor 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 labor opportunities remain uncertain and insecure.

occupational choice as emphasized in the model (Table 3, Columns 1-5), and then on earnings and their seasonality (Columns 6-9). Appendix Tables A5 and A6 present further robustness checks on these main results on occupational choice.

On the extensive margin of occupational choice, Columns 1-3 confirm the 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. As in Figure 3, the effect on the extensive margin is largely stable moving from two to four years after the program'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).[23] 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 labor supply of wage employment with respect to asset transfers and skills provision, is higher than the short run elasticity. 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 .00), possibly because between two and four years targeted women became more efficient in production as they gain experience in livestock rearing.[24]

Table A2 shows that the program has minimal spillovers on the occupational choices of other household members. We find small increases in hours devoted to self-employment (presumably helping out the main beneficiary) but no effect on wage employment, which indicates, reassuringly that the program does not reduce wage earnings of other household members.[25]

[23] A natural concern is that respondents falsely report that they devote time to self-employment only to please BRAC's enumerators. Two considerations allay this concern. First, the magnitude of the increase in self-employment hours (just over an hour a day) is in line with BRAC's estimate of the time it takes to tend to one cow. Since respondents are not told this and are unlikely to find out unless they do it themselves, the fact that the magnitudes match reassures us that time use responses are truthful. The finding, reported in the next section, that they still own a (live) cow after four years also indicates that they must be devoting some time to it. Second, the TUP program did not require them to reduce hours in wage labor and given that the average beneficiaries reported working an average of three hours per day at baseline there is no reason to think they would falsely report a drop in wage labor hours.

[24] 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. The total increase in annual labor supply is almost identical: 216 hours, so that the figures used for the later cost-benefit analysis are robust to these alternative regression models.

[25] This is not surprising, as Foster and Rosenzweig [1996] document for rural India, rural labor markets tend to

In both years the increase in self-employment hours is larger than the fall in wage employment hours, so that total labor 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 labor 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 program: (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 labor effort more evenly across the year and to become less reliant on highly seasonal wage employment in 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 program on the share of occupational activities held regularly, defined as those performed at least 300 days per year, and on the share of activities with seasonal earnings, 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.[26]

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 program. Total annual earnings are computed as the sum of earnings from all wage employment and self-employment activities, where the former equals all monetary and in-kind wage payments and the latter equals revenues minus costs. Column 8 shows that total annual earnings of treated poor women rose by TK1548 after two years, and by TK1754 four years after the program's initiation. These represent earnings increases of 34% and 38% respectively relative to baseline. Column 9 shows how labor productivity - measured by hourly earnings - increases over time. Two years after the program'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

be highly segmented by gender so that any wage impacts for female occupations do not affect wages for occupations engaged in predominantly by men.

[26] Bryan *et al.* [2011] report the impacts of an alternative intervention to help households counter seasonal fluctuations in agricultural labor demand earnings in rural Bangladesh: the provision of cash incentives to out-migrate. Using an RCT design, they find this induces 22% of households to send a seasonal migrant, and that treated households continue to re-migrate at higher rates even after the financial incentive is removed.

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 productivity in self-employment activities has also risen ($r_{i1} > r_{i0}$).[27]

To disentangle the effect of occupational change from the increase in productivity within self-employment activities, we estimate (2) separately for individuals specialized in wage employment and self-employment at baseline, which are also balanced between treatment and control communities (Table A3). The results in Table A4 indicate that the increase in productivity occurs entirely within occupation. Women who shift from wage labor to self-employment maintain the same hourly earnings after four years (Table A4, Panel A, Column 9). For these women total earnings rise because they work more hours as they shift from wage employment, that is only available for part of the year, to self-employment that yields the same hourly returns but is available *throughout* the year. In contrast, women who were already specialized in self-employment experience a 50% increase in hourly earnings (Table A4, Panel B, Column 9).

5 Extended Results

5.1 Asset Accumulation

Women eligible for the TUP program can choose the form the asset transfer takes from a wide-ranging menu of self-employment activities, including different combinations of livestock, vegetable cultivation, small-scale retail and crafts like basket weaving. Among those that took-up the offer, over 97% of beneficiaries chose livestock rearing. Of these 50% chose cows, 38% a cow-poultry or cow-goat combination,and 9% chose a combination not involving cows. Different packages were similarly valued at TK9500. Table 4 first documents the program's impacts on household's livestock holdings. The second half of the table examines the impact on land holdings, that allows household to further diversity away from earnings from uncertain wage labor markets, and are an intrinsic proxy for social status in these communities.

Table 4 indicates that after two and four years households own more livestock despite being free to liquidate 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 program. The number of poultry and goats also increases in line with average program transfers

[27] These findings on total earnings, combined with those on labor productivity all point in the direction of livestock rearing being a profitable activity in this setting for treated households. This is somewhat in contrast to recent results in Anagol *et al.* [2012] documenting how the ownership of livestock generate relatively low returns for households in rural India.

(2.42 poultry and .74 goats)[28] 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 endline, fewer 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 TK9983 and TK10,734 after two and four years. In the short term this is in line with the asset transfer value of TK9500, but rises significantly above this after four years, presumably through the 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 TK9500 are .04 and .00, respectively).[29]

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 (and livestock), also determine social standing within the community. Columns 5 and 6 in Table 4 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 be owning 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 and 38% for owning land. The fact targeted poor households are increasing 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 program is indicative of the transformative impact that easing capital and skills constraints has on the economic lives of the poor.

Finally, Column 7 sheds light on whether the program allows beneficiaries to accumulate savings or whether the additional income is entirely spent. We find that household savings increase by TK1051, that is a ten-fold increase with respect to baseline levels. Together with the findings on livestock and land, this reinforces the view that the program succeeds in lifting the extremely poor

[28] Averages are computed over *all* beneficiaries: 23% actually chose a combination with poultry, and 24% chose a combination with goats.

[29] We cannot say whether these are exactly the *same* animals they were given at the beginning of the program 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.

from mere subsistence and setting them on a sustainable trajectory out of poverty.

5.2 Expenditure and Subjective Well-Being

Table 4 further documents how the program ultimately impacts household welfare, as proxied by per capita expenditure and food security. Columns 8 and 9 show that per capita expenditure on both food and non-food consumption items significantly increase two and four years after the program's initiation. The impact on non-food expenditure rises over time, increasing by 17% after two years and by 48% after four years (p-value .000). In contrast, the effect on food expenditures decreases slightly from 6% to 4% of baseline values (p-value .260).[30] Total per capita expenditure increases by 7% and 8% relative to baseline after two and four years, respectively. Benchmarked against the global poverty line of US$1.25, these changes imply that the share of households living in extreme poverty drops by 9pp, 11% of its baseline level. This reduction in headcount poverty is remarkable when we consider that at baseline, the average eligible women started far below the poverty line, living on 93c per day.

Households are defined to be food secure if members can afford two meals per day on most days. Column 10 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.[31]

Finally, Columns 11 and 12 report the effect of the program on two contrasting 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 classify them as "satisfied" if they report to be satisfied or very satisfied. The program improves life satisfaction by 3pp after two years and by 6pp (15% of the baseline mean) after four. The latter effect is significantly different from zero, and highlights that eligible households do, over time, perceive the dramatic changes in their economic lives. This is despite the fact that on average they supply significantly more hours to labor market activities, as highlighted in Table 3. We return to this issue on the monetary and utility gains of the program when we conduct a cost benefit analysis below. 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 program. The contrasting results in Columns

[30] 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 endline. In terms of food quality, 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.

[31] These impacts match the findings of Banerjee *et al.* [2011] who evaluate an TUP-style pilot program 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 they also document significant improvements in food security.

11 and 12 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.[32]

5.3 Quantile Treatment Effects on Earnings and Expenditure

The theoretical framework highlights how the TUP program should induce heterogeneous impacts across eligible households depending on the balance of skills provision and wealth effects induced by the two components of the program. Households that are less well-off and more constrained to begin with might be less impacted by the program. The fact that our data collection exercise covers all eligible households 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. 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 program on earnings and expenditures are indeed heterogeneous but always positive and significantly different from zero at all deciles. On earnings, as shown in Figure 4A, four years after implementation the program impacts are largest at the top deciles of the earning distribution. The differences are sizable: the effect at the ninth decile of earnings is TK4136, and less than one tenth of this value at TK384 at the first decile. 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.[33]

In line with the quantile treatment effects on earnings, four years after implementation the program impacts are largest at the top deciles of the per capita consumption distribution, with the impact at the top decile being 10 times larger than the point estimate for the first decile (Figure 4B). Indeed, four years after its initiation, the TUP does not significantly increase the per capita consumption of households who were 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 impact.

5.4 Closing the Gap Between the Eligible Poor and Other Wealth Classes

Our partial population experiment and household sampling strategy allows us to compare changes in outcomes over time for targeted poor women relative to women in higher tiers of Bangladeshi

[32] 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.

[33] This finding 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. On the inefficient retention of livestock, Anagol *et al.* [2012] document how households in rural India appear to receive negative rates of return from holding cows and buffalo.

rural society at baseline. This enables us to provide evidence on whether the program's impact was large enough to allow eligible women to move significantly up the within-community class ladder. Figure 5 benchmarks the effect of the program 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: $\frac{\hat{\beta}_2^{kTP}}{\bar{k}_{0C}-\bar{k}_{0TP}}$, where $\hat{\beta}_2^{kTP}$ is the ITT impact of the program on outcome k for the treated poor at endline, 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 program 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 intervals.

For ease of interpretation, Figure 5 also reports a vertical line at one: that is the size program effects need to be in order to entirely close the gap (so that$\hat{\beta}_2^{kTP}= \bar{k}_{0C}-\bar{k}_{0TP}$). To be clear, an estimated impact of one suggests the causal impact of the TUP program 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 program causes eligible households to close part of the gap; and an estimated impact significantly greater than one suggests the causal impact of the program is large enough so that eligible households overtake the comparison households on that margin. A negative impact would imply eligible households diverge from households belonging to other classes on that margin.

Panel A of Figure 5 benchmarks the program impacts on eligible households relative to their initial gap with near poor households. On land ownership the treated poor close about half the gap with the near poor and on life satisfaction almost all the gap. For the other key measures such as specialization in wage employment, livestock ownership and per capita expenditures they actually overtake the near poor.[34]

Panel B shows that the impact of the program is such that it goes a long way to reduce the gap between the treated poor and the middle classes. On key dimensions such as specialization in wage employment, value of livestock owned, per capita expenditure and life satisfaction, the effect of the program covers, on average, around 40% of the gap with middle class women. The one exception is land ownership where the share of the targeted poor who have managed to acquire land is small relative to middle class women.

These results are striking. They indicate that, as a result of the program, the economic cir-

[34]We use baseline differences to measure relative gaps. Each difference is measured in absolute terms so, for example, on specialization in wage employment, Panel A shows that eligibles are less specialized in wage labor than the near poor. We could alternatively 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 program on the treated poor with potential changes in outcomes among other classes through general equilibrium impacts. Such mechanisms and spillovers are considered in Bandiera *et al.* [2013].

cumstances of the poorest women in the rural communities we study have risen above those of the near poor and have moved significantly towards those of middle class women. That this has been achieved after just four years is significant. Figure 5 thus provides us with a stark and striking picture of the extent of transformation in the economic lives of extreme poor.

6 A Counterfactual Policy: Unconditional Cash Transfers

All the documented evidence suggests the TUP program has large and sustained impacts on the occupational choices and economic lives of the eligible poor. After four years, eligible womens' annual earnings increase by TK1754 (Table 3, Column 8), corresponding to a 38% increase over their baseline levels. At the same time, the program comes at a high cost per potential beneficiary: TK20,700 (around US$300) per household, including the value of the livestock asset, training costs and BRAC operating costs specific to the program. Most of these costs are incurred in the first two years of the program, when asset transfers take place and training is provided. Indeed, BRAC is not involved in the day-to-day running of the program 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 eligibles will eventually offset the lifetime program costs.

The more substantive question is whether the same resources could have been better utilized if targeted to the same households under the natural counterfactual policy of an unconditional cash transfer of the same magnitude.[35] To compare these, we need assumptions on how an unconditional cash transfer would be spent. 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: across all sample households 21% of households report having one, and we find at least one household with an MFI saving account in 79% of communities.

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 TK20,700 at 4.5% then yields an annual flow payment of TK932 after four years, which deflated by the same factor of livestock income (by the rural CPI) is equivalent to TK700. This is significantly lower than the average program effect on annual earnings of TK1754 (p-value .001) as reported in Column 8 of Table 3.

[35] On other potential counterfactuals, recall that the TUP program 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, then by revealed preference and absent informational constraints, this suggests there do not exist other more profitable forms of self-employment for these households.

The earnings comparison however does not capture all the relevant information needed to compare the change in *utility* associated with the program with the change in utility that would accrue with a cash transfer. Besides increasing earnings, the program transforms the occupational structure of the treated by shifting them from wage employment to self-employment, increasing the number of days they work per year, reducing the number of hours per day and their exposure to earnings volatility across agricultural seasons. If the daily cost of effort is convex or the eligible poor have limited access to consumption smoothing technologies, these changes should increase utility, other things equal. On the other hand, the program increases total labor supplied and correspondingly reduces leisure by 218 hours, thus lowering utility, all else equal.

Quantifying utility differentials due to these factors is obviously difficult. Even assuming the change in occupational structure does not provide 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 labor 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*. The program causes beneficiaries to work more hours in periods when there is no demand for their labor in the agricultural wage labor 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 in Figure 4A. 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 time input.

By revealed preference, beneficiaries at all deciles of the earnings distribution must be at least as well off with the program as without it. Assuming the beneficiaries with the lowest earnings gain are indifferent between taking up the program or not, this implies the value of 218 hours of forgone leisure is equal to TK370. Assuming all beneficiaries have the same linear preferences for earnings and leisure, beneficiaries with earnings higher than 700+370 =TK1070 are then better off with the program than with an equivalent cash transfer. The program 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 *underestimates* the share of beneficiaries for whom the program dominates an unconditional cash transfer for two reasons: (i) we have ignored any utility gains arising from the program enabling households to smooth their earnings and consumption; (ii) 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.[36] Clearly, taking into account such issues of earnings smoothing and resources leaking away from intended beneficiaries, implies the TUP program might indeed be preferred by the majority of the poor relative to an unconditional cash transfer of the same value.

7 Conclusion

The question of what keeps people mired in poverty is one of the oldest in economics. The development macroeconomics literature is replete with examples of how occupational change, economic development and poverty reduction proceed together. The time horizon in these studies is long-run and the question of how occupational change can be brought about is less than clear. The development microeconomics literature, in contrast, tends to focus on short-run evaluations of the impact of programs and policies with little emphasis on occupational change. This paper is located at the join between these literatures.

Our setting, in rural Bangladesh, is representative of many across the developing world where vast numbers of very poor people are dependent on insecure, seasonal wage labor. In these settings the natural progression of *in situ* occupational change, particularly at the bottom of the wealth distribution, is often painfully slow.[37] Our large-scale and long-run randomized control trial thus addresses the question of whether sizable transfers of assets and skills can catapult the poorest members of rural communities in Bangladesh into occupations that had been the preserve of non-poor women in the communities they share.

What we find is that simultaneous transfers of both assets and skills through the TUP program have quantitatively large and permanent impacts on the occupational choices and earnings of the targeted poor. Given a menu of choices the poorest women in Bangladeshi villages overwhelmingly chose to take on the livestock rearing activities practiced by more wealthy women in the communities they share. Our story is thus one of aspirations realized. The treated poor successfully move away from being reliant on selling their labor in insecure wage labor markets, towards engaging in independent basic entrepreneurship activities framed around livestock rearing. That the capital and skills transferred by the program enable them to make this transition and that they persist on a higher occupational path long after program assistance is withdrawn constitute the two main findings from this study.

Occupational change, driven by large injections of capital and skills, transforms the economic lives of the poor to a point where their economic circumstances have risen above those of the near poor and moved significantly towards those of middle class women. Self-employment hours

[36] Using data from the *Progresa* conditional cash transfer program in rural Mexico, Angelucci *et al.* [2010] show that eligible households transfer resources towards non-eligible relatives: for every peso received by eligibles, their relatives' food consumption expenditure increases by 13 cents.

[37] The plots for control women in Figure 3 demonstrate this.

increase, wage employment hours decrease, labor supply is spread more evenly across the year, ownership of land and livestock assets increase and earnings, expenditure and life satisfaction all rise. The paper thus provides concrete evidence that the extreme poor are not inalienably dependent on the non-poor via employment and other relationships nor is their position in the rural societies they inhabit immutable or fixed [Scott 1977, Gulesci 2012]. When provided with sufficient capital and skills, other constraints (for example related to social norms, self control or other behavioral biases or misperceived returns to capital or human capital investments), are not binding enough to prevent extremely disadvantaged women from becoming independent, successful entrepreneurs.

Three factors are likely to be critical to understanding the transformation of economic lives wrought by the program. The first is the fact that capital and skills arrived together and are likely to have been complementary. The availability of capital might not be sufficient to start *new* businesses in the absence of complementary training, and training might not be sufficient without capital.[38],[39] The second is the magnitude of the capital and skill transfers. These both set this program apart from more standard microfinance and training programs and also imply that such transfers are unlikely to be provided via the market.[40] The third is that the outside employment options for the women we study, namely insecure wage labor, are very poor. The self-employment opportunities provided by the program therefore provide an attractive alternative occupation for them to supply labor to.

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. We find that investments in physical and human capital enable poor women to move up a clearly defined, within village occupational ladder away from the bottom rung of insecure wage employment and towards more secure self-employment. This may be structural change writ small but, as documented, the welfare gains from moving up this occupational ladder

[38] Recent evaluations of business training programs for aspiring entrepreneurs with and without capital grants provide evidence of such complementarity [de Mel *et al.* 2012]. This is also consistent with the fact that many evaluations of microfinance suggest it does not help create new businesses [Banerjee *et al.* 2010, Crepon *et al.* 2011, Karlan and Zinman 2011, Kaboski and Townsend 2011] and with the 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, McKenzie and Woodruff 2012]. It is also consistent with the fact that while microloans were offered in the rural communities we study, the treated women were not using them.

[39] Argent *et al.* [2013] present non-experimental evidence from Rwanda on the returns to training related to animal husbandry as part of the Girinka One Cow policy. They find substantial returns to such training on the likelihood households produce milk, earnings from milk, and asset accumulation.

[40] On the capital side the lumpiness of the investment required to start a high value livestock business would likely mean that a typical microloan and its associated repayment requirements would not be sufficient to finance it [Field *et al.* 2012, Banerjee et al 2010, Fafchamps *et al.* 2011]. On the training side the assistance provided is much more intensive and long-lasting than the standard classroom based business training programs evaluated in the literature and very poor women would be unlikely to be able to obtain such expertise from non-poor women in the communities they share.

are considerable. Given the centrality of occupational change to overall development and growth it would seem that programs which enable poor people to upgrade occupations, rather than just make them more productive in a given occupation, deserve greater attention.

References

Aghion.P, P.Howitt and D.Mayer-Foulkes (2005) "The Effect of Financial Development on Convergence: Theory and Evidence," *Quarterly Journal of Economics* 120: 173-222.

Ahmed.A.U, M.Rabbani, M.Sulaiman and N.C.Das (2009) The Impact of Asset Transfer on Livelihoods of the Ultra Poor in Bangladesh, Research Monograph Series, RED, BRAC No 39.

Anagol.S, A.Etang and D.Karlan (2012) Continued Existence of Cows Disprove Central Tenets of Capitalism?, mimeo, Yale University.

Angelucci.M and G.De Giorgi (2009) "Indirect Effects of an Aid Program: How Do Liquidity Injections Affect Non-Eligibles' Consumption?," *American Economic Review* 99: 486-508.

Angelucci.M, G.De Giorgi, M.A.Rangel and I.Rasul (2010) "Family Networks and Schooling Outcomes: Evidence From a Randomized Social Experiment," *Journal of Public Economics* 94: 197-221.

Argent.J, B.Augsburg and I.Rasul (2013) Livestock Asset Transfers With and Without Training: Evidence from Rwanda, mimeo, UCL.

Alatas.V, A.V.Banerjee, R.Hanna, B.Olken and J.Tobias (2012) "Targeting the Poor: Evidence from a Field Experiment in Indonesia," *American Economic Review* 101: 1206-40.

Bandiera.O, R.Burgess, N.Das, S.Gulesci, I.Rasul and M.Sulaiman (2013) Community Wide Impacts of an Ultra-Poor Program, mimeo LSE.

Banerjee, A. (2004) "Contracting Constraints, Credit Markets, and Economic Development," in M.Dewatripoint,L.Hansen and S.Turnovsky, (eds.) *Advances in Economics and Econometrics: Theory and Applications*, Eighth World Congress of the Econometric Society, Vol. III. Cambridge University Press.

Banerjee.A.V and E.Duflo (2007) "The Economic Lives of the Poor," *Journal of Economic Perspectives* 21: 141-68.

Banerjee.A.V and E.Duflo (2008) "What Is Middle Class About the Middle Classes Around the World?," *Journal of Economic Perspectives* 22: 3-28.

Banerjee.A.V, E.Duflo, R.Chattopadhyay and J.Shapiro (2011) Targeting the Hardcore Poor: An Impact Assesment, mimeo MIT.

Banerjee.A.V, E.Duflo, R.Glennerster and C.Kinnan (2010) The Miracle of Microfinance? Evidence from a Randomized Evaluation, mimeo MIT.

Banerjee.A.V and S.Mullainathan (2010) The Shape of Temptation: Implications for the Economic Lives of the Poor, NBER Working Paper 15973.

Banerjee.A.V and A.F.Newman (1993) "Occupational Choice and the Process of Development,"

Journal of Political Economy 101: 274-98.

Becker.G.S (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 *Handbook of Development Economics*, Vol. 3A. pp2125-207, T.N. Srinivasan and J. Behrman, eds., Amsterdam: Elsevier.

Behrman.J (2010) "Investment in Education - Investment and Incentives" In D.Rodrik and M.Rosenzweig (eds.), *Handbook of Development Economics*, Vol. 5, Amsterdam: Elsevier.

BRAC (2011) BRAC Bangladesh Annual Report, Dhaka, BRAC.

Bruhn.M, D.Karlan and A.Schoar (2012) The Impact of Consulting Services on Small and Medium Enterprises: Evidence from a Randomized Trial in Mexico, mimeo Yale University.

Bryan.G, S.Chowdhury and A.M.Mobarak (2011) Seasonal Migration and Risk Aversion: Experimental Evidence from Bangladesh, mimeo LSE.

Buera.F and J.P.Kaboski (2012) "The Rise of the Service Economy," *American Economic Review* 102: 2540-69.

Buera.F and J.P.Kaboski and Y.Shin (2012) The Macroeconomics of Microfinance, mimeo UCLA.

Bruhn.M and D.Mckenzie (2009) "In Pursuit of Balance: Randomization in Practice in Development Field Experiments," *American Economic Journal: Applied Economics* 1: 200-32.

Caselli.F and W.J.Coleman (2011) "The U.S. Structural Transformation and Regional Convergence: A Reinterpretation." *Journal of Political Economy.* 109: 584-61

Chenery.H.B and M.Syrquin (1975) *Patterns of Development 1950-1970*, London: Oxford University Press.

Crèpon.B, F.Devoto, E.Duflo and W.Parientè (2011) Impact of Microcredit in Rural Areas of Morocco: Evidence from a Randomized Evaluation, mimeo MIT.

Das.N.C and F.A.Misha (2010) Addressing Extreme Poverty in a Sustainable Manner: Evidence from the CFPR Programme, CFPR Working Paper 19.

de Mel.S, D.McKenzie and C.Woodruff (2008) "Returns to Capital in Microenterprises: Evidence from a Field Experiment," *Quarterly Journal of Economics* 123:1329-372.

Drexler.A, G.Fischer and A.Schoar (2010) Keeping It Simple: Financial Literacy and Rules of Thumb, CEPR Discussion Paper 7994.

Drèze.J and A.K.Sen (1989) *Hunger and Public Action*, Oxford University Press.

Emran.M.S, V.Robano and S.C.Smith (2009) Assessing the Frontiers of Ultra-Poverty Reduction: Evidence from CFPR/TUP, An Innovative Program in Bangladesh, mimeo GWU.

Fafchamps.M, D.J.McKenzie, S.Quinn and C.Woodruff (2011) When is Capital Enough to Get Female Microenterprises Growing? Evidence from a Randomized Experiment in Ghana, CEPR Discussion Paper 8466.

Fairlie.R, D.Karlan and J.Zinman (2012) Behind the GATE Experiment: Evidence on Effects of and Rationales for Subsidized Entrepreneurship Training, mimeo Yale.

Field.E, S.Jayachandran and R.Pande (2010) "Do Traditional Institutions Constrain Female Entrepreneurial Investment? A Field Experiment on Business Training in India," *American Economic Review Papers and Proceedings*: 100:125-29.

Field.E, R.Pande, J.Papp and N.Rigol (2012) "Does the Classic Microfinance Model Discourage Entrepreneurship Among the Poor? Experimental Evidence from India," forthcoming *American Economic Review*.

Foster.A. and M.Rosenzweig (1996) "Comparative Advantage, Information and the Allocation of Workers to Tasks: Evidence from an Agricultural Labor Market," *Review of Economic Studies* 63: 347-74.

Galor.O. and J.Zeira (1993) "Income Distribution and Macroeconomics," *Review of Economic Studies,* 60: 35-52.

Gine.X and R.Townsend (2004) "Evaluation of Financial Liberalization: A General Equilibrium Model with Constrained Occupation Choice" *Journal of Development Economics* 74: 269-307.

Gulesci.S (2012) Labor-Tying and Poverty in a Rural Economy: Evidence from Bangladesh, mimeo Bocconi University.

Imbens.G. and J.M.Wooldridge (2009) "Recent Developments in the Econometrics of Program Evaluation," *Journal of Economic Literature* 47: 5-86.

Jeong.H and R.Townsend (2008) "Growth and inequality: Model evaluation based on an estimation-calibration strategy" *Macroeconomic Dynamics* 12: 231-284.

Jensen.R (2010) "The (Perceived) Returns to Education and the Demand for Schooling," *Quarterly Journal of Economics* 125: 515-48.

Jensen.R (2012) "Do Labor Market Opportunities Affect Young Women's Work and Family Decisions? Experimental Evidence from India," *Quarterly Journal of Economics* 127: 753-92.

Kaboski.J and R.M.Townsend (2011) "A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative," *Econometrica* 79: 1357-406.

Kahneman.D. and A.Deaton (2010) "High Income Improves Evaluation of Life but not Emotional Well-being," *Proceedings of the National Academy of Sciences*, Early Edition.

Karlan, D and J.Morduch (2010) "Access to Finance" In D.Rodrik and M.Rosenzweig (eds.), *Handbook of Development Economics*, Vol. 5, Amsterdam: Elsevier.

Karlan.D and M.Valdivia (2011) "Teaching Entrepreneurship: Impact of Business Training on Microfinance Clients and Institutions," *Review of Economics and Statistics* 93: 510-27.

Karlan.D and J.Zinman (2011) "Microcredit in Theory and Practice: Using Randomized Credit Scoring for Impact EvaluAtion," *Science* 332: 1278-84.

Khandker.S and W.Mahmud (2012) Seasonal Hunger and Public Policies: Evidence from Northwest Bangladesh, Washington, D.C., World Bank.

Kuznets.S. (1966) *Modern Economic Growth*, New Haven, CT: Yale University Press

McKenzie.D and C.Woodruff (2012) What Are We Learning from Business Training and Entrepreneurship Evaluations Around the Developing World?, mimeo, Warwick University.

Morduch.J (1988) Do Microfinance Programs Really Help the Poor? New Evidence from a Flagship program in Bangladesh, mimeo, Harvard University.

Morduch.J, S.Ravi and J.Bauchet (2012) Failure vs. Displacement: Why an Innovative Anti-Poverty Program Showed No Impact", mimeo CGAP.

Moulick.M,P.Mukherjee, S.M.Rahman and G.A.N.Wright (2011) Deposit Assessment in Bangladesh, IFC Report.

Murphy.K, A.Shleifer and R.Vishny (1989) "Income Distribution, Market Size, and Industrialization," *Quarterly Journal of Economics* 104: 537-56.

Ngai.L.R and C. A.Pissarides (2007) "Structural Change in a Multi-Sector Model of Growth," *American Economic Review* 97: 429-43.

Reinikka.R. and J.Svensson (2004) "Local Capture: Evidence from a Central Government Transfer Program in Uganda," *Quarterly Journal of Economics* 119: 679-706.

Schoar.A (2009) The Divide Between Subsistence and Transformational Entrepreneurship, mimeo MIT.

Schultz.T.W (1961) "Investment in Human Capital," *American Economic Review* 51: 1-17.

Schultz.T.W (1980) "Nobel Lecture: The Economics of Being Poor," *Journal of Political Economy* 88: 639-51.

Scott.J (1977) *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*, Yale: Yale University Press.

Sen.A (1981) *Poverty and Famines: An Essay on Entitlements and Deprivation*, Oxford: Clarendon Press.

Strauss.J and D.Thomas (1995). "Human Resources: Empirical Modeling of Household and Family Decisions" in *Handbook of Development Economics*, Vol. 3A. pp1883-2023, T.N. Srinivasan and J. Behrman, eds., Amsterdam: Elsevier.

Townsend.R.M (2011) *Financial Systems in Developing Economies: Growth, Inequality and Policy Evaluation in Thailand*, Oxford: Oxford University Press.

APPENDICES FOR ONLINE PUBLICATION

Appendix 1: Proofs

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 $r_i > w$. We show that in this case there are three tresholds of I that determine whether the individual participates in the labor force, whether the asset constraint is binding and whether it is optimal to engage in both occupations. This divides the solution space in four cases.

Case (a): $L_i^* = S_i^* = 0$, $\alpha \geq 0$ and $\beta \geq 0$. The FOCs reduce to,

$$wu'(I_i) - v'(1) + \alpha = 0, \tag{3}$$

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,

$$\frac{d\tilde{I}_i}{dr_i} = -\frac{u'(\tilde{I}_i)}{r_iu''(\tilde{I}_i)} > 0, \ \frac{d\tilde{I}_i}{dw} = 0. \tag{4}$$

Finally note that the smallest endowment level at which $\alpha = 0$ and (3) 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): $L_i^* = 0$, $S_i^* \in (0, \frac{I_i}{p_k})$, $\alpha \geq 0$, $\beta = 0$ and $\gamma = 0$. In this case the individual is not capital constrained $p_kK_i < I_i$ and the FOCs reduce to,

$$wu'(r_iS_i^* + I_i) - v'(1 - S_i^*) + \alpha = 0, \tag{5}$$

$$r_iu'(r_iS_i^* + I_i) - v'(1 - S_i^*) = 0. \tag{6}$$

The FOC for self-employment (6), 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 (6) 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 (6) 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 (6) 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 (6) it is straightforward to derive the following results,

$$\frac{dS_i^*}{dI_i} = -\frac{r_i u''(r_i S_i^* + I_i)}{r_i^2 u''(r_i S_i^* + I_i) + v''(1 - S_i^*)} < 0, \; \frac{dS_i^*}{dr_i} = -\frac{[u'(r_i S_i^* + I_i) + r_i S_i^* u''(r_i S_i^* + I_i)]}{r_i^2 u''(r_i S_i^* + I_i) + v''(1 - S_i^*)}, \tag{7}$$

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,

$$\tilde{\tilde{I}}_i = p_k S_i^*(r_i, \tilde{\tilde{I}}_i). \tag{8}$$

To see the properties of this boundary endowment level we can totally differentiate (8) to show that,

$$\frac{d\tilde{\tilde{I}}_i}{dr_i} = \frac{p_k \frac{dS_i^*}{dr_i}}{1 - p_k \frac{dS_i^*}{dI_i}} > 0, \tag{9}$$

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 (5) and (6) 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): $L_i^* = 0$, $S_i^* = \frac{I_i}{p_k}$, $\alpha > 0$, $\beta = 0$ and $\gamma > 0$, that is the individual is asset constrained ($p_k S_i = I_i$.) and the FOCs reduce to,

$$wu'(r_i \frac{I_i}{p_k} + I_i) - v'(1 - \frac{I_i}{p_k}) + \alpha = 0, \tag{10}$$

$$r_i u'(r_i \frac{I_i}{p_k} + I_i) - v'(1 - \frac{I_i}{p_k}) - \gamma = 0. \tag{11}$$

As usual the FOCs are decreasing in I_i and so (10) can be used to implicitly define the smallest endowment level, denoted $\tilde{\tilde{I}}_i$, at which it just becomes optimal for$L_i^* > 0$,

$$wu'(r_i \frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) - v'(1 - \frac{\tilde{\tilde{I}}_i}{p_k}) = 0. \tag{12}$$

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 (12),

$$\frac{d\tilde{\tilde{I}}_i}{dw} = -\frac{u'(r_i\frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i)}{\left[w(\frac{r_i}{p_k}+1)u''(r_i\frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) + \frac{1}{p_k}v''(r_i\frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i)\right]} > 0, \tag{13}$$

$$\frac{d\tilde{\tilde{I}}_i}{dr_i} = -\frac{w\frac{\tilde{\tilde{I}}_i}{p_k}u''(r_i\frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i)}{\left[w(\frac{r_i}{p_k}+1)u''(r_i\frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i) + \frac{1}{p_k}v''(r_i\frac{\tilde{\tilde{I}}_i}{p_k} + \tilde{\tilde{I}}_i)\right]} < 0. \tag{14}$$

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 $I_i \in [\tilde{\tilde{I}}_i,\ \tilde{\tilde{I}}_i)$, $L_i^* = 0$ and $S_i^* = \frac{I_i}{p_k}$.

Case (d): $L_i^* > 0$, $S_i^* = \frac{I_i}{p_k}$ and $\alpha = \beta = 0$, $\gamma > 0$. In this case the individual engages in both occupations the FOCs reduce to,

$$wu'(wL_i + r_i\frac{I_i}{p_k} + I_i) - v'(1 - L_i - \frac{I_i}{p_k}) = 0, \tag{15}$$

$$r_iu'(wL_i + r_i\frac{I_i}{p_k} + I_i) - v'(1 - L_i - \frac{I_i}{p_k}) - \gamma = 0. \tag{16}$$

As L_i approaches zero, then the FOC (15) will be satisfied precisely at $\tilde{\tilde{I}}_i$. For strictly positive wage employment supply, (15) defines the equilibrium wage employment supply function, $L_i^* = L_i^*(w,\ r_i,\ I_i)$. Totally differentiating this it is straightforward to show,

$$\frac{dL_i^*}{dr_i} = -\frac{w\frac{I_i}{p_k}u''(wL_i + r_i\frac{I_i}{p_k} + I_i)}{[w^2u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + v''(1 - \frac{I_i}{p_k} - L_i)]} < 0, \tag{17}$$

$$\frac{dL_i^*}{dI_i} = -\frac{\left[w\left(\frac{r_i}{p_k}+1\right)u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + \frac{1}{p_k}v''(1 - \frac{I_i}{p_k} - L_i)\right]}{u''(wL_i + r_i\frac{I_i}{p_k} + I_i) + v''(wL_i + r_i\frac{I_i}{p_k} + I_i)} < 0, \tag{18}$$

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

hence $sign\left[\frac{dL_i^*}{dw}\right] = sign[u'(wL_i^*) + wL^*u''(wL_i^*)]$ 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): $L_i^* = S_i^* = 0$, $\alpha \geq 0$ and $\beta \geq 0$. The FOCs (3) and (**??**) apply. From (3), 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,

$$\frac{d\hat{I}_i}{dw} = -\frac{u'(\hat{I}_i)}{wu''(\hat{I}_i)} > 0. \tag{20}$$

Case (f): $L_i^* > 0$, $S_i^* = 0$ and $\alpha = 0$, $\beta > 0$ and $\gamma = 0$, so the FOCs reduce to,

$$wu'(wL_i + I_i) - v'(1 - L_i) = 0, \tag{21}$$

$$r_i u'(wL_i + I_i) - v'(1 - L_i) + \beta = 0. \tag{22}$$

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

$$\frac{dL_i^{**}}{dI_i} = -\frac{wu''(wL_i + I_i)}{w^2u''(wL_i + I_i) + v''(1 - L_i)} < 0, \tag{23}$$

$$\frac{dL_i^{**}}{dw} = -\frac{[u'(wL_i + I_i) + wL_i^* u''(wL_i + I_i)]}{[w^2u''(wL_i + I_i) + v''(1 - L_i)]}, \tag{24}$$

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 labor force. For these, the program weakly reduces L through the wealth effect. In particular, individuals who were out of the labor force ($I_i > \widetilde{I}$) stay out of the labor force. Individuals with ($\widetilde{I}_i - A < I_i < \widetilde{I}_i$) exit the labor force (labor hours drop by L^{**}) Individuals with ($\widetilde{I}_i - A > I_i$) 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 program. Labor 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:

3a. There exists a threshold $\bar{A}$ defined by $\tilde{I}(\overline{r_{i1}}) - \bar{A} = 0$ where $\overline{r_{i1}} = max_i(r_{i1})$, such that for all $A > \bar{A}$ self-employment hours fall for all individuals. To prove this note that for $A > \bar{A}$, $\tilde{I}(r_{i1}) - \bar{A} < 0$ for all i, thus all individuals exit the labor force as a consequence of the program and for all individuals previously choosing $S_i > 0$, self-employment hours fall. This proves part (i) of the proposition

3b. 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 labor 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 labor 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 $S^*(r_{i1}, I_i+A) > S^*(r_{i0}, I_i)$

- $\tilde{I}(r_{i0}) < I_i \leq \widetilde{I}(r_{i1}) - A$ - for these individuals it is optimal to stay out of the labor force before treatment and to join after treatment; self-employment hours increase by $S^*(r_{i1}, I_i + A)$

- $I_i > \widetilde{I}(r_{i1}) - A$ - for these individuals it is optimal to stay out of the labor force before and after treatment. This proves part (ii) of the proposition.

3c. 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 labor 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 labor 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 labor 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 labor force, reducing hours by $S^*(r_{i0}, I_i)$ after treatment.■

Appendix 2: Robustness Checks on the Main Results

Table 2 shows that, compared to their counterparts in treatment communities, eligible women in control communities are 7 percentage points more likely to be sole earners in their households and, relatedly, 5 percentage points more likely to specialize in wage labor. While these differences are precisely estimated, their magnitude is small compared to the sample variation: the normalized differences are .11 and .08 respectively. This notwithstanding, the fact that eligibles differ on this dimension raises the concern that our estimated program effects might be biased if the occupational choice of sole earners followed a different time trend. To address the practical relevance of this concern Table A5 reports estimates of the program effects 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. We estimate:

$$y_{idt} = \alpha + \sum_{t=1}^{2} \beta_t W_t T_{id} + \gamma T_i + \sum_{t=1}^{2} \delta_t W_t + \sum_{t=1}^{2} \zeta_t W_t SED_i + \lambda SED_i + \eta_d + \epsilon_{idt}, \qquad (25)$$

where $SED_i = 1$ if i is a sole earner and 0 otherwise. Reassuringly, as Table A5 shows, we find that the estimated program 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. Moreover, we also find that all estimated effects on asset accumulation, per capita expenditures and measures of well-being are also robust to allowing for differential time trends. These results are available upon request.

To further check that the estimated impacts are not contaminated by the fact that eligible beneficiaries in control communities are too disadvantaged to be a valid counterfactual for the poor in treatment communities, Table A6 estimates (25) for all our baseline outcomes using the entire sample of poor women in control communities as a control group instead of the eligible women only. As described in the text, the participatory wealth ranking exercise identifies all households that are deemed to be poor by community members. BRAC officers then divide these in two groups: those who are eligible to receive the TUP program ("eligible poor") and those who are not ("near poor"). Table 1 shows that the "near poor" are indeed less disadvantaged: less likely to be sole earners and engaged in wage labor, more likely to be literate and to own livestock. In Table A6 we use both the eligible poor and the near poor as control group, taken together these are less disadvantaged than the eligibles in treatment communities. Table A6 shows that the estimated program 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 program by BRAC officers, follow similar trends in occupational choices. As for the earlier check, we also find that all estimated effects on asset accumulation, per capita expenditures and measures of well-being are also robust to using this alternative control group. These results are available upon request.

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	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 program (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 labor (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 labor activity and then summing across all wage labor 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 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: Normalized difference of means

	(1) Treated Communities	(2) Control Communities	(3) Raw Differences	(4) Normalized Differences
A. Household Characteristics				
Primary female is the sole earner [yes=1]	.378	.455	-.007***	-.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 labor (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 labor activity and then summing across all wage labor 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 3: The Impact of the Ultra Poor Program 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
Program 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)
Program 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 program effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (endline) 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 program 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 labor (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 labor activity and then summing across all wage labor 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. All monetary values are deflated to 2007 Takas using the rural CPI published by Bangladesh Bank.

Table 4: The Impact of the Ultra Poor Program on Household Asset Accumulation, Expenditures and Well Being

Difference in Difference ITT Estimates
Standard Errors in Parentheses Clustered by Community

	Livestock Assets				Land		Savings	Expenditures			Well Being	
	(1) Cows	(2) Poultry	(3) Goats	(4) Value of All Livestock	(5) Rents Land For Cultivation	(6) Owns Land for Cultivation	(7) Household savings	(8) PCE Non Food	(9) PCE Food	(10) Food Security	(11) Satisfied [yes=1]	(12) Experience Anxiety [yes=1]
Program effect after 2 years	1.075***	2.155***	0.667***	9983.531***	0.069***	0.005	982.7***	179.633***	541.35***	0.176***	0.031	0.000
	(0.02)	(0.17)	(0.04)	(240.00)	(0.01)	(0.01)	(46.05)	(64.53)	(178.79)	(0.03)	(0.02)	(0.02)
Program effect after 4 years	1.063***	1.641***	0.415***	10734.124***	0.109***	0.026***	1051.1***	503.356***	331.32*	0.081***	0.064**	0.014
	(0.03)	(0.15)	(0.03)	(292.77)	(0.01)	(0.01)	(60.45)	(83.70)	(169.95)	(0.03)	(0.02)	(0.02)
Mean of outcome variable in treated communities at baseline	0.083	1.79	0.147	940.31	.058	.068	121.36	1054.5	8861.1	.457	0.404	0.531
Two year impact = Four year impact [p-value]	.588	.001	.000	.007	.000	.000	.281	.000	.260	.000	0.124	0.587
Four year impact = Initial Programmed Transfer [p-value]	.541	.000	.000	.000	-	-	-	-	-	-	-	-
Adjusted R-squared	0.414	0.090	0.106	0.328	0.059	0.031	0.0873	0.026	0.031	0.185	0.045	0.145
Number of eligible poor women	6732	6732	6732	6732	6732	6732	6732	6732	6732	6732	6732	6732
Observations (clusters)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	20196 (1309)	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 programmed effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (endline) 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 programmed 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 in Columns 1-10 are measured at the household level. Those in Columns 11 ands 12 are for the eligible female. The value of all livestock is the sum of the value of all cows, goats and chickens owned by 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 10 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 11 is a dummy variable equal to one if the individual reports to be satisfied or very satisfied with their life overall, and zero otherwise. The outcome in Column 12 is a dummy variable equal to one if the individual reports experiencing episodes of anxiety over the past year, and zero otherwise. In 2007, 1USD=69TK. All monetary values are deflated to 2007 Takas using the rural CPI published by Bangladesh Bank.

Figure 1A: Occupational Choice Equilibrium: $r_i > w$

Time Allocated to Wage Labor, Self-employment

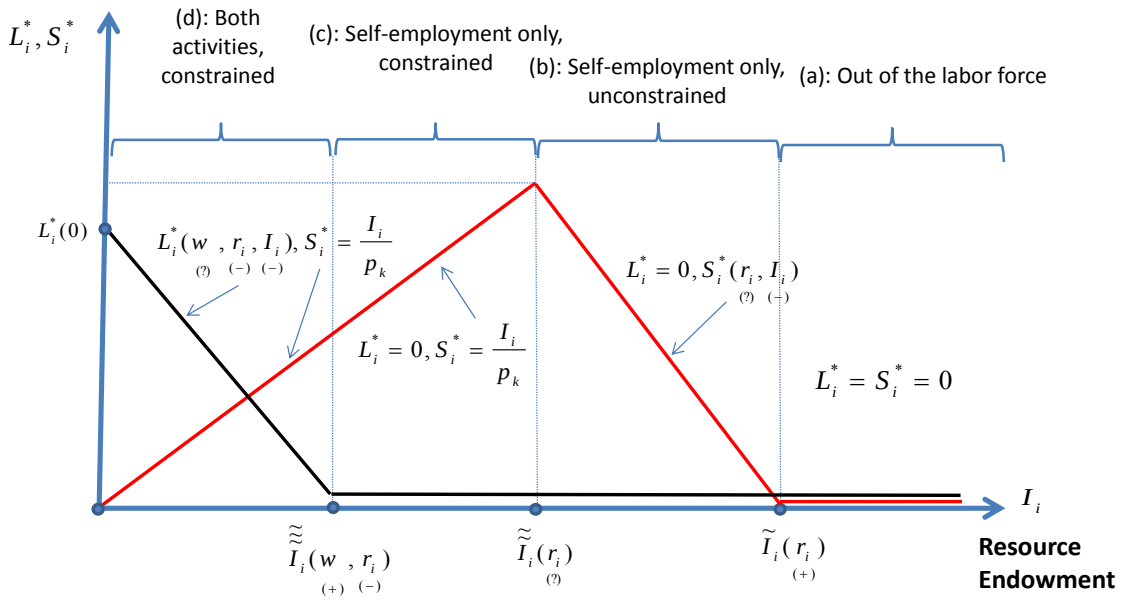


Figure 1B: Occupational Choice Equilibrium: $r_i < w$

Time Allocated to Wage Labor, Self-employment

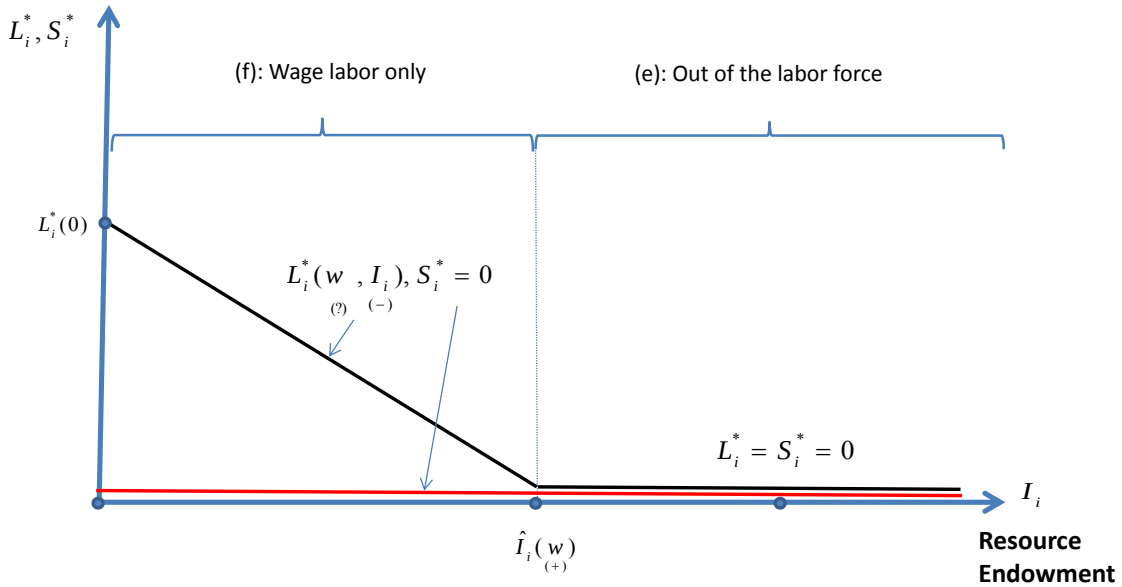


Figure 2A: Impact of the Asset Transfer Component of the Program: $r_i > w$

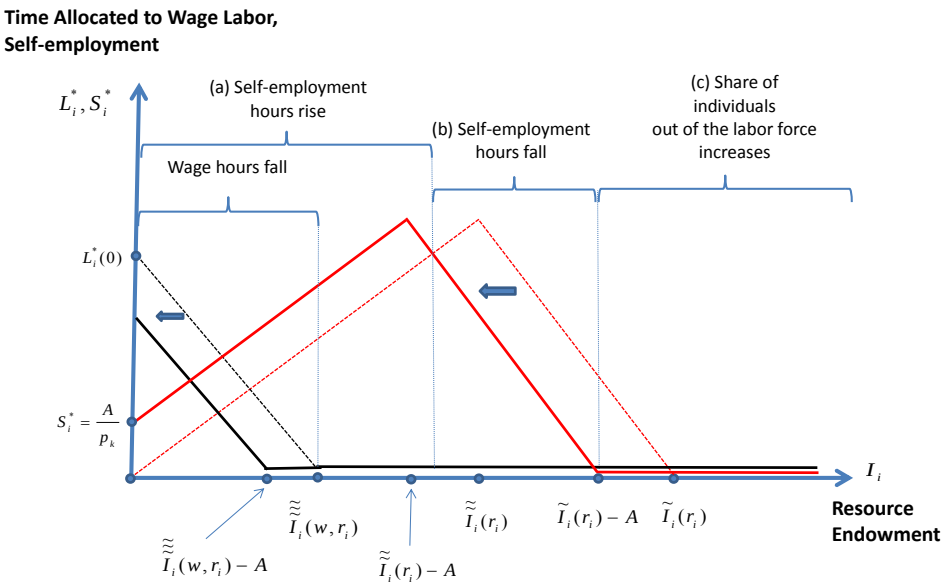


Figure 2B: Impact of the Training Component of the Program: $r_i > w$

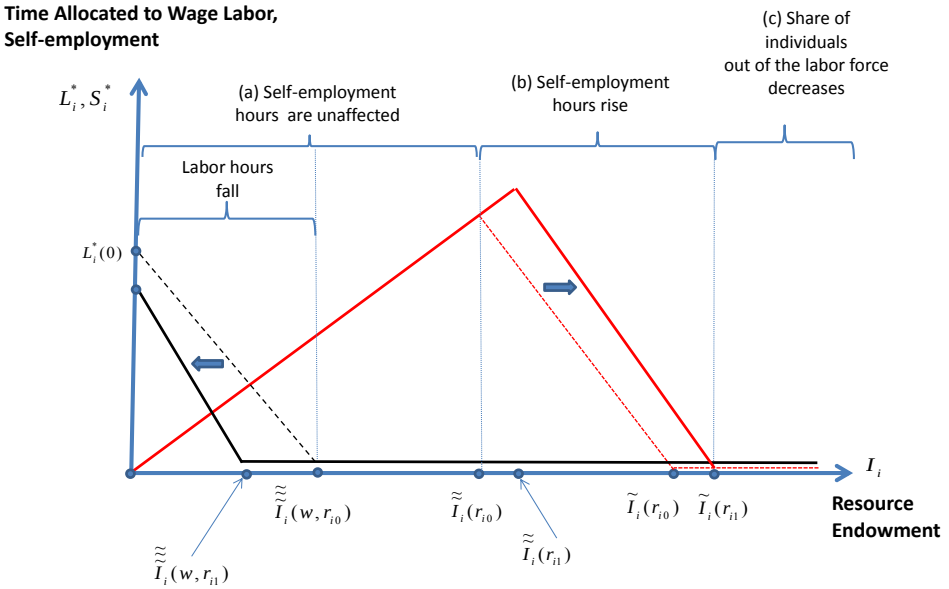


Figure 2C: Impact of the Asset Transfer Component of the Program: $r_i < w$

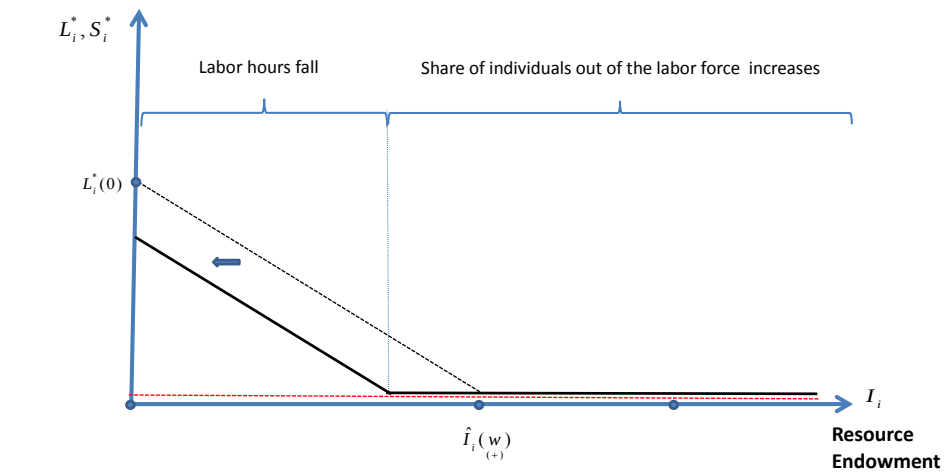
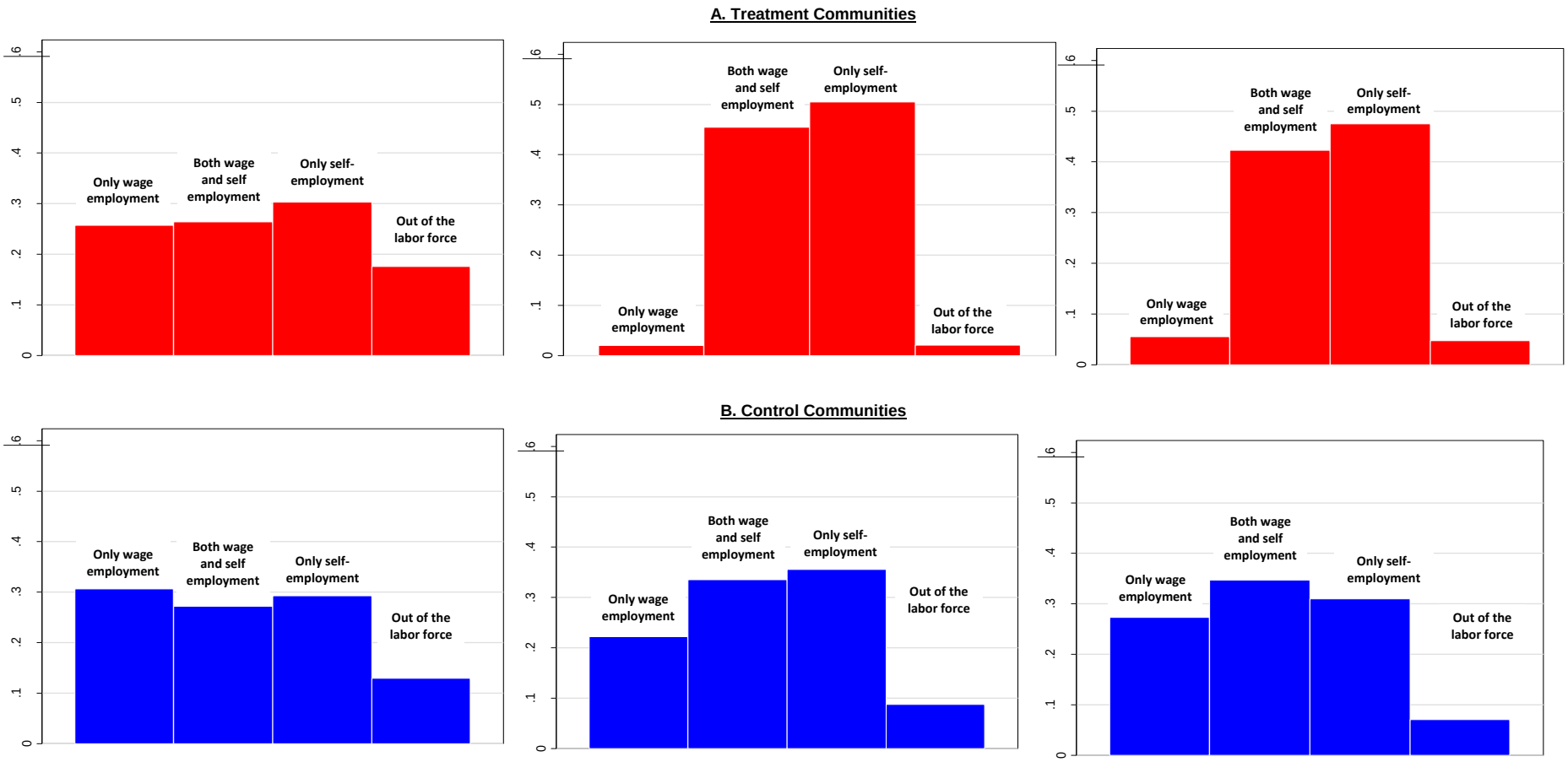


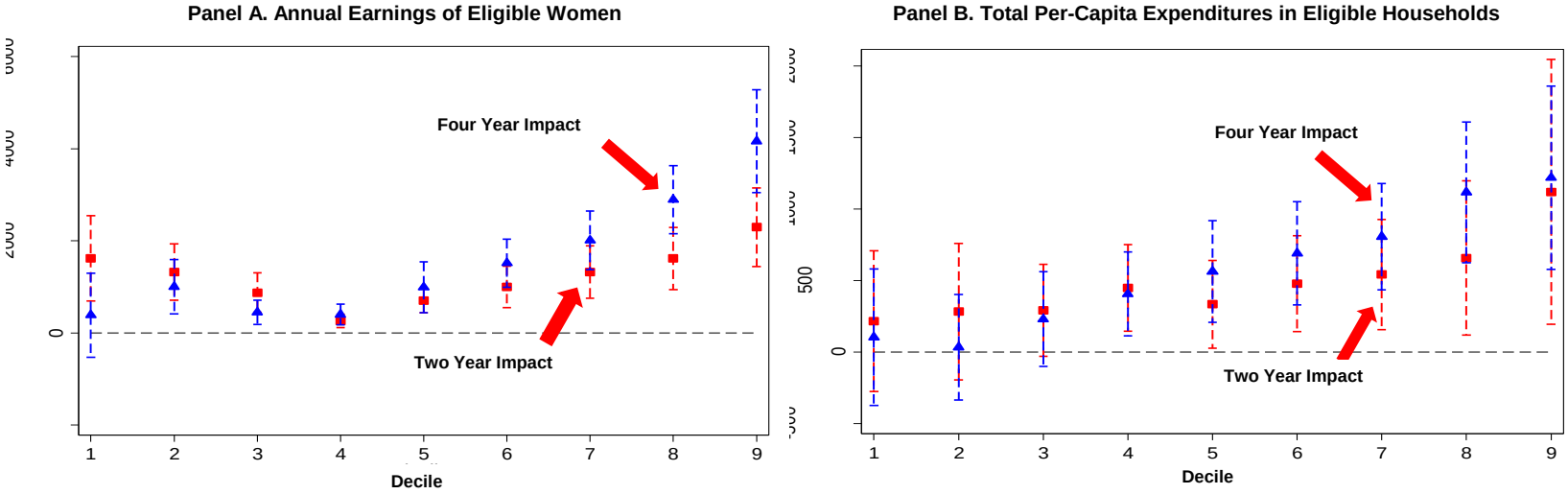
Figure 3: The Extensive Margin Occupational Choices, by Treatment and Control Communities at Baseline, Midline and Endline

Baseline | **Midline: Two years after program implementation** | **Endline: Four years after program implementation**



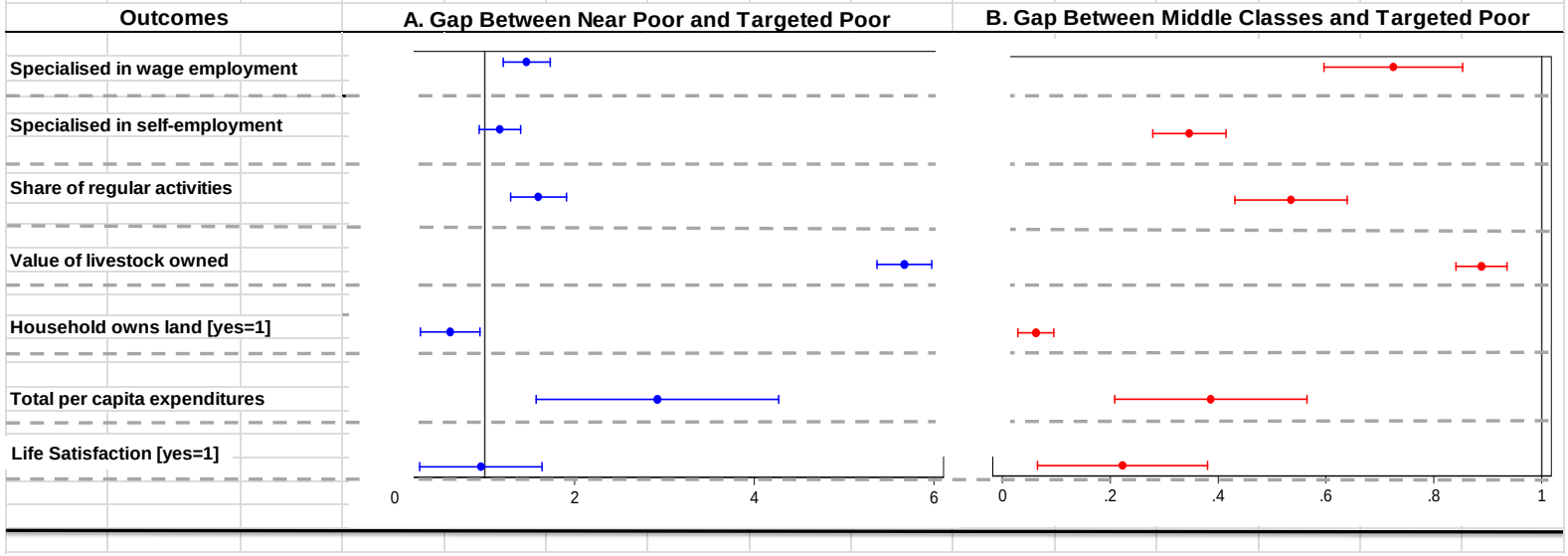
Notes: Each histogram shows the proportion of eligible women in each occupational category: solely engaged in wage employment, engaged in both wage and self employment, solely engaged in self employment, and out of the labor force. The woman is defined to be specialized in wage labor (the dummy equals 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. Panel A shows this for treatment communities, and Panel B shows this for control communities. The left hand side figures in each panel refer to the baseline survey, the middle figures refer to the midline survey (two years after baseline), and the right hand side figures refer to the endline survey (four years after baseline).

Figure 4: Quantile Treatment Effects



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 endline (four years after baseline). 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 labor 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. The adult equivalence scale gives weight 0.5 to each child younger than 10. In 2007, 1USD=69TK.

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 program 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 program 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 labor (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. Life satisfaction is a dummy variable equal to one if the individual reports to be satisfied or very satisfied with their life overall, and zero otherwise. The adult equivalence scale gives weight 0.5 to each child younger than 10. In 2007, 1USD=69TK.

Table A1: 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)
Subdistrict 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, endline), 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 A2: The Impact of the Ultra Poor Program 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 labor	(2) Hours devoted to self-employment	(3) Hours devoted to wage employment	(4) Hours devoted to self-employment	(5) Hours devoted to wage labor	(6) Hours devoted to self-employment
Program 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)
Program 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
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 program effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (endline) 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 program 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 labor activity and then summing across all wage labor activities.

Table A3: The Economic Lives of the Eligible Women at Baseline, by Treatment Status and Occupation

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

	Panel A: Specialized in Wage Labor at Baseline				Panel B: Specialized in Self-employment at Baseline			
	(1A) Treated Communities	(2A) Control Communities	(3A) Raw Differences	(4A) Normalized Differences	(1B) Treated Communities	(2B) Control Communities	(3B) Raw Differences	(4B) Normalized Differences
A. Household Characteristics								
Primary female is the sole earner [yes=1]	.570	.606	-.036	-.052	.287	.369	-.082	-.124
	(.495)	(.489)	(.025)		(.452)	(.483)	(.024)	
Primary female is literate [yes=1]	.037	.023	.014*	.056	.103	.104	-.001	-.003
	(.188)	(.150)	(.008)		(.304)	(.305)	(.015)	
Household owns livestock [yes=1]	.150	.142	.008	.016	.742	.724	.018	.029
	(.357)	(.349)	(.022)		(.438)	(.447)	(.024)	
Value of livestock owned [Takas]	151	95.9	55.1	.044	1771	1648	123	.019
	(1104)	(607)	(42.2)		(4843)	(4456)	(251)	
Total per capita expenditures [Takas]	10411.95	9656.88	755.069***	.103	9565.14	9571.79	-6.65	-.001
	(5167.35)	(4675.469)	(255.49)		(3874.65)	(4605.7)	(221.68)	
B. Individual Occupational Choice								
Hours devoted to wage employment	1385	1533	-148***	-.142	-	-	-	-
	(741)	(730)	(43.0)					
Hours devoted to self-employment	-	-	-	-	889	925	-36.6	-.036
					(720)	(716)	(39.2)	
Share of income generating activities held regularly	.189	.232	-.043**	-.081	.747	.719	.028	.050
	(.360)	(.391)	(.021)		(.403)	(.403)	(.023)	
Share of income generating activities with seasonal earnings	.850	.848	.002	.004	.540	.461	.079	.125
	(.329)	(.328)	(.021)		(.458)	(.444)	(.027)	
Earnings per hour	5.67	5.09	.582***	.101	2.50	2.61	-.116	-.019
	(4.49)	(3.61)	(.215)		(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 labor; Panel B refers to those that were specialized in self-employment at baseline. Columns 1A and 1B report statistics based on eligibles in treatment communities; Columns 2A and 2B report statistics based on eligibles in control communities. Columns 3A and 3B report the difference in means and its standard error clustered at the community level. Columns 4A and 4B 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 labor (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 labor activity and then summing across all wage labor 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

Table A4: The Heterogeneous Impacts of the Ultra Poor Program on the Occupational Choices and Earnings of Eligible Women

Difference in Difference ITT Estimates
Standard Errors in Parentheses Clustered by Community

Panel A: Specialized in Wage Labor 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
Program 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)
Program 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: Specialized 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
Program 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)
Program 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 labor; Panel B refers to those that were specialized in self-employment at baseline. The program effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (endline) 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 program 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 labor (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 labor activity and then summing across all wage labor 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 A5: The Impact of the Ultra Poor Program 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 labor	(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
Program 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)
Program 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
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 program effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (endline) 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 program 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 labor (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 labor activity and then summing across all wage labor 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 A6: The Impact of the Ultra Poor Program 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 labor	(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
Program 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)
Program 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 program effect after two (four) years is the coefficient on the interaction between the treatment indicator and the indicator for the midline (endline) 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 program 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 labor (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 labor activity and then summing across all wage labor 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.