Essays in Labor and Development Economics

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Public Policy and Economics)
in The University of Michigan
2008

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ACKNOWLEDGEMENTS

I would like to acknowledge Rohini Somanathan and Stefan Dercon who were co-authors on chapter 1: Aid and Agency in Africa: Explaining Food Disbursements Across Ethiopian Households, 1994-2004 as well as Gregory D. Hess and Ralph Chami who were co-authors on chapter 3: (Why) Do Self-Employed Parents Have More Children?

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CHAPTER I

Introduction

This dissertation consists of three chapters on labor and development economics. The first two chapters investigates a particular type of safety net in rural Ethiopia, namely the presence of food aid programs. The role of food aid has played an important role in Ethiopia, and many developing countries, for disaster relief, development, and as a means to reduce vulnerability to agricultural shocks. The first two chapters of the dissertation investigates who the beneficiaries of aid programs are. Chapter 1 investigates the targeting mechanisms used to identify which households are eligible for aid and once selected what criteria are used to determine aid allocations. When discretion is given in selecting recipients and aid allocations, agency problems may arise. Chapter 2 moves away from targeting issues and investigates the potential health effects aid can have on labor market participants, adult men and women. Chapter 3 uses U.S. data to examine the hypothesis that non-benevolent, self-employed households increase their expected family size to raise the likelihood that an inside family member will be a good match at running the business. Hence, having larger family sizes raises the self-employed household's expected return to their business.

CHAPTER II

Aid and Agency in Africa: Explaining Food Disbursements Across Ethiopian Households, 1994-2004.

2.1 Introduction

African aid has been receiving a lot of attention. Heated debates center on whether more aid to countries in Sub-Saharan Africa is a solution to the problems of acute poverty and malnutrition in this region. Some argue that massive injections of foreign aid to African countries build dependency, foster corruption and weaken the basis for efficient trade flows, while others support aid as an indispensable tool for alleviating poverty in the world's poorest countries. A proper understanding of the role of foreign aid in Africa relies on a knowledge of how existing allocations of food aid are distributed across regions and households. If current allocations are directed towards needy households, one might be optimistic about the effects of future flows. Serious targeting deficiencies on the other hand, would suggest that attention to improved monitoring systems should accompany higher levels of aid. We contribute to the aid debate by examining the relationship between free food disbursements and household characteristics in rural Ethiopia, a region of the world which has come to be known both for its vulnerability to agricultural shocks and sizable aid flows.

Although regional targeting and donor incentives to provide food aid have been well studied[1], the literature on intra-village food allocations is quite limited. Clay et al.(1999) uses cross-sectional data from a nationally representative survey of households conducted in the mid-nineties and finds no significant relationship between household food insecurity and aid. This is attributed to female and elderly headed households receiving food aid regardless of need and to aid being concentrated in historically deficit areas. In Jayne et al. (2002), the same data is used to distinguish between the hypothesis of 'chronic needs', where areas in Ethiopia with a history of drought and famine receive the bulk of food aid, with the 'inertia' hypothesis, under which the distribution of aid is governed by the existing network of aid distribution centers. Sharp (1997) highlights the cultural norms prevalent in many African societies to share wealth; there appears to be a tendency for local representatives to be equitable in aid allocations and that in villages where inequitable selection criteria were used, households often redistributed aid among themselves.[2]

Although the precise mechanism for the allocation of food aid in Ethiopia remains unclear, official documents suggest that there are at least two levels at which food needs are assessed, the Wereda or district level and the household level. Members representing the government, international donors, and non-government organizations conduct Wereda level assessments while representatives within villages identify needy households. The Disaster Prevention and Preparedness Commission (DPPC) is the official body that is responsible for the allocation of food aid and, on the basis of its guidelines for aid disbursements, it appears to be fairly committed to serving those in need. Most aid however is routed through peasant associations (PAs), which cover several villages and are the lowest administrative unit in Ethiopia. We are in-

[1] For a discussion of area targeting by donor countries refer to Barrett (2001), Shapouri and Missiaen (1990), and Zahariadis et al. (2000). Jayne et al. (2002) describes aid allocations across districts within Ethiopia.

[2] Dercon and Krishnan (2003) is related in that it shows that imperfect targeting can be remedied with village level risk-sharing.

terested in the manner in which these village bodies allocate food aid in the presence of some monitoring by the DPPC. This type of community-level targeting at the village level is common in many African countries where community leaders have been historically important and information flows between villages and higher levels of government are limited. Anthropological studies for Ethiopia show that community members do have knowledge of the needs of different families [Sharp, 1997], but the effectiveness with which they use this information has been debated and criticized.[3]

We use a framework that incorporates the potential trade-off between the richer informational set possessed by the local representatives and their incentives to transfer resources to households to whom they are connected or to those capable of providing them reciprocal transfers or greater influence. Several researchers have explored the theoretical case for decentralizing the delivery of public services. Bardhan and Mookherjee (1998) provide a theoretical framework that compares the trade-off between the informational advantages of delegating the tasks to lower level authorities and the lack of accountability that local elites have to the poor and show that the theoretical case for decentralization depends on the degree of local capture by local elites. Galasso and Ravallion (2000) model the behavior of local organizations and find some support for capture by the elites when public spending is on a private good. We build on the previous studies by investigating the role of informal power within African villages in determining food disbursements.

Our data comes from six rounds of the Ethiopian Rural Household Survey (ERHS) conducted between the years 1994 to 2004. We construct a panel data set of about 800 households living in eleven peasant associations that were chosen so as to cover

[3]As Jean Dreze and Amartya Sen point out:

> The leaders of a village community undoubtedly have a lot of information relevant for appropriate selection. But...there is also the question as to whether [they] have strong enough motivation - or incentives-to give adequately preferential treatment to vulnerable groups... [Dreze and Sen, 1991].

all major farming systems in the country. We focus on the distribution of free aid as opposed to food-for-work and are interested in two specific questions: First, were aid recipients poorer and more vulnerable than other households? Second, within the set of recipients were there systematic influences in the quantity of aid allocated and in particular, did allocations work to equalize income across households?

We find clear evidence that the probability of receiving aid decreases with higher levels of income. While households at the $25th$ percentile of the income distribution have an average probability of 60 percent of receiving aid, at the $75th$ percentile this probability falls to 32 percent. These estimates suggest that community representatives have information on household need and use it to identify recipients. Conditional on receiving free food aid, however, food aid receipts are uncorrelated with income but are correlated with a measure of self-reported power available from one of the survey rounds. Within the set of recipients, it is the more powerful households that receive a disproportionate share of food aid. These empirical patterns are consistent with a model in which the DPPC does monitor PAs but can observe the set of aid recipients much more easily than their precise aid needs. PAs in turn favor households that provide influence in ways that are least observable to the monitoring agency.

A standard problem with studies of targeting is that income is often measured with error and, in our setting, may be endogenous if aid affects productivity or incentives to work. We use land and livestock ownership as instrumental variables to check the robustness of these results. The estimated effect of income on the probability of receiving aid is larger under these specifications suggesting that income may in fact be endogenous or measured with error. Our results are also robust to the inclusions of time-varying village level fixed effects.

We believe that these findings form a significant addition to the literature on the determinants and the effects of food aid in Africa. Most studies using household level data agree that *Food for Work* programs reach primarily poor households while *Free Distribution* is found to do only marginally better, on average, than a random allocation of aid across households [Clay et al., 1999, Quisumbing, 2003]. Our richer data set (large number of households within villages, repeated observations on the same villages and households and measures of informal village level influence) and a conceptual framework which makes a distinction between aid receipts and aid recipients may account for these different findings.

We proceed in the next section with a brief institutional history of organizations involved in the allocation of food aid in Ethiopia. A theoretical framework is presented in Section 3, followed by a description of the data in section 4. Our empirical specification is in Section 5 and results in Section 6. Section 7 concludes.

2.2 The administration of food aid in Ethiopia

The governmental organization which overseas the Wereda level assessment is the Disaster Prevention and Preparedness Commission (DPPC), formerly known as the Relief and Rehabilitation Commission. The DPPC was established in response to the famine of 1973/1974 in the northern part of Ethiopia. Its activities were aimed at preventing disasters and reducing individual and household vulnerability to agricultural shocks. A primary goal of the DPPC is to direct resources towards addressing the root causes of vulnerability to famine and food shortages by linking relief with development. The effectiveness of food aid targeting is viewed as crucial to its success.

The DPPC, along with help from international donors and NGOs conduct detailed assessments of weather conditions, crop production, livestock availability, wage labor opportunities, and market prices for chronically needy districts.[4] Assessments are carried out at least twice a year to capture the two primary agricultural seasons. Districts which are not classified as chronically needy, conduct their own assessments and report their estimated need to the DPPC. National guidelines issued by the DPPC suggest criteria for determining needy households but discretion has always been given to local level representatives. The first guidelines, issued in 1979 stated that in times of natural disaster, priority should go to households with no assets or alternative sources of income and the lowest priority group were households who had food resources but needed rehabilitation assistance. When enough resources were available, all affected households were to receive aid with the highest priority group receiving more per person.

After two updates to the original 1979 guidelines and the famine of 1984/1985, the National Policy on Disaster Prevention and Management was passed in 1993 [TGE, 1993]. Groups explicitly mentioned in the document as requiring special assistance are the old, the disabled, lactating and pregnant women, and persons who are required to attend to young children. Discretion for identifying needy households remained with representatives of the PA. A committee of PA elders and representatives, with local knowledge of the area and of individual need, were to report their assessments to the Wereda Administration. The sixth round of the Ethiopian Rural Household Survey, which will be described in detail in Section 2.4, asks household heads and village representatives for criteria that they believe are used in identifying aid recipients. Appendix A lists the top five responses for each group. The old, the poor and the disabled are ranked in the top five by both village members and village

[4] A chronoically needy district is a district which has needed food aid assistance for a number of consecutive years.

representatives.

It is sometimes argued that in a poor country like Ethiopia where approximately 50 per cent of the population live below the national poverty line, the targeting of aid is not important because everyone is in need of assistance. Using an average poverty line of 600 birr per capita for food consumption [Dercon and Krishnan, 1998], Table 1 shows that between 20 and 50 percent of the sampled households did not have enough food consumption to meet their basic needs.[5] Also note that this fraction varied considerably across villages and across time within the same village. Table 2 depicts the within village variation of annual income per capita and annual consumption per capita.[6] The shaded areas in the table represent the round the village received aid.[7] The figures in these two tables emphasize the importance of well-targeted aid and the difficulties in a top-down approach to allocations: Village and household needs vary considerably from one period to the next and coverage is far from complete. This suggests the importance of looking closely at issues of targeting.

2.3 A principal-agent framework

A proper assessment of needs requires a great deal of information that is hard to obtain outside the village. Income, disability, age, land quality and networks of household support all jointly determine the the optimal distribution of aid. The challenge faced by benevolent donors is to take advantage of local knowledge while minimizing misappropriation. To understand the type of misallocation that might occur, we model this as a problem in which a principal (the DPPC or an international

[5] 1 U.S. dollar equaled approximately 6.00 birr in 1994.

[6] In the analysis that follows income per capita will be used instead of consumption per capita. Income is a better measure of idiosyncratic shocks and because it excludes transfers, it better captures the insurance function of food aid.

[7] The shaded areas only represent the round which the village received free aid, for example, Haresaw suffered a drought in 1994 which effected crop production in 1994 and 1995, while there was no free aid reported in the village, there was a food-for-work program in the village.

donor organization) channels aid through agents (village representatives in PAs) and has some imperfect monitoring technology which determines the agent's payoffs.

Suppose that $\bar{\Delta}$ is the total of aid alloted to a village. This value may have been determined by assessments made by the principal, or requests sent in by village representatives. Given this total amount of aid to the village, suppose Δ_i^* is the optimal allocation of aid to household i and Δ_i is the actual transfer of aid to this household. We use A_i^* and A_i as indicator variables for strictly positive values of Δ_i^* and Δ_i respectively. We use δ_i and a_i to denote the difference between actual and optimal values for these two set of variables.

If household utility is increasing and concave in income, and fully captures its need for food aid, the first best allocation with a utilitarian planner, $\Delta(y)$ would be linear in y and all households below some threshold level $\bar{y}(\bar{\Delta})$ would be brought up to that level and no households above that threshold would receive aid. The principal cannot however observe food needs and is therefore not capable of implementing this allocation. This is left to the agent and the agent's actions are imperfectly monitored. Monitoring can take place through random audits [Allingham and Sandmo, 1972], a system of checks and balances, or through a village level appeals system where village members are able to voice concern over aid allocations [TGE, 1993]. We do not explicitly model the monitoring process. We simply assume that some form of imperfect monitoring occurs at the village level and that the expected penalty associated with misallocating aid depends both on the extent to which the set of recipients deviates from the optimal set and the deviations of aid amounts. These are put in as separate arguments to allow for the plausible case when the principal can observe the values of a_i's more easily than the δ_i's.

The agent, on his part, would like to distribute aid to maximize what we call his influence, $I(y, \delta, p)$. The value of influence from allocating aid to a household captures the ability of the household to make reciprocal transfers to the agent. We assume that such influence is non-decreasing in household income, y_i, the transfer of aid above its optimal value, δ_i, and household power, p_i. In addition $I_{y\delta} > 0$ and $I_{p\delta} > 0$ so agents would prefer to over allocate aid to households that are rich or powerful. Total influence is given by $\sum_i I(y_i, \delta_i, p_i)$. This specification is not meant to suggest that agents are not altruistic or driven by any other considerations, it is simply meant to capture the forces that may cause actual allocations to systematically deviate from optimal ones. How important these forces are is an empirical question which we will turn to below.

To summarize, we suppose that the penalty function is given by $\sum_i F(a_i^2, \delta_i^2)$ and the agent chooses a value of δ_i for each individual to solve:

$$\sum_i [I(y_i, \delta_i, p_i) - F(a_i^2, \delta_i^2)] \tag{2.1}$$

subject to the constraint that $\sum_i \delta_i = 0$.

The agent equalizes the net gain from allocating aid across households. For any two agents i and j, the first order conditions to the above problem require that for any two households i and j in the village, $I_{\delta_i} - F_{\delta_i} = I_{\delta_j} - F_{\delta_j}$.

The nature of this allocation will depend on the joint distribution of household characteristics in the village. It is easy to see however why agents might limit distortions in the a_i's and make them instead in the δ_i's. If, for example, the penalty function is given by $\sum_i (a_i^2 + \delta_i^2)$, the agent will set all a_i's equal to zero by allocating small amounts of aid to all deserving households. Controlling for the level of income, we would expect to find households with more power receiving more than their optimal allocation. The relationship between income and aid is less clear because, although richer households are more capable of making reciprocal transfers to the agent, income is more easily verifiable ex-post and so the penalties associated with transfers to richer households are also higher.

2.4 Data

We will test how effective community-level targeting has been in rural Ethiopia in targeting income and whether variables which capture power or influence in the village will have an impact on the probability of receiving aid or the amount of aid receive. Recall that there were two arguments put forth above about how to interpret the insignificant role of income in determining aid allocations: (1) there was a desire to be equitable in aid allocations or (2) the lack of accountability to the poor resulted in errors of exclusion and errors of inclusion.[8] The predictions of the model suggest that if the lack of correlation between income and aid is due to the latter argument then variables which capture influence or power should be positive and significant and if monitoring costs differ across the two stages of targeting then power would be most significant in determining aid allocations conditional on being selected to receive aid since it is easier to manipulate how much aid a household receives than who receives aid. The former argument implies that power or influence should have no impact on aid allocations at either stage. In order to test this, data comes from the Ethiopian Rural Household Survey (ERHS) covering six rounds of data between the years 1994 to 2004. The survey was administered by the International Food Policy Research Institute (IFPRI) in collaboration with the department of economics at Addis Ababa University (AAU) and the Center for the Study of African Economies

[8] We also discussed Clay et al.'s (1999) findings that a significant number of food secure female headed and elderly headed households received aid. While these are examples of errors of inclusion they are not necessarily examples of being unaccountable to the poor. We investigate the role of gender and age in the empirical section.

(CSAE) at Oxford University.

The initial survey conducted in 1989 surveyed seven villages to study the response of households to food crises. At the time of the survey, there were no intentions of creating a longitudinal data set. The 450 households within the seven peasant associations were randomly selected while the villages located in the regions of Amahara, Oromiya, and SNNPR, in southern and central Ethiopia, were primarily ones that suffered from the 1984-1985 famine and other droughts that followed between 1987 and 1989. In 1994, CSAE and AAU conducted a panel survey incorporating six of the seven villages surveyed in 1989, plus an additional nine villages to give approximately 1500 households surveyed. The villages were chosen to account for the diversity among the major farming systems. The attrition rate from 1989-1994 in the six villages used in the 1989 survey was less than 7 percent. The lost households were replaced by households which were considered by village elders and officials as being similar to, in demographic and wealth terms, as the households which could not be traced. Households formed out of households interviewed in 1989 were also interviewed, usually sons or daughters who after marriage formed their own household. The large number of randomly selected households within each village allows us to investigate within village aid allocations.

In this paper we use all six rounds from 1994 to 2004 which contain approximately 1400 households surveyed from fifteen peasant associations. Round 2 and 3 took place in 1995 approximately 4-8 months apart, so to ensure comparability to the other rounds, round 2 and 3 were combined in order to capture the main cropping seasons for the entire year. This leaves us with five rounds of data, with data covering the years 1994, 1995, 1997, 1999, and 2004. Of the fifteen peasant associations surveyed, eleven peasant associations received aid in at least one round. Between fifteen and forty-two percent of our sample received aid in a given round, with as much as one hundred percent coverage in the village of Korodegaga in round two to as little as eleven percent coverage in the village of Adele Keke. Table 3 gives the spatial and temporal coverage for each of the villages in our analysis.

In determining the probability of receiving aid, we use all households in the villages which received aid, while in determining the amount of aid received we restrict our analysis to only households which received aid in any of the surveyed rounds. This sampling framework allows us to take advantage of the panel data to investigate the decision rule for why some households receive aid in one round and not in another.

The ERHS collected information on household consumption, household income, household assets, and household demographics. The ERHS has detailed information on whether the household received aid, how much aid the household received, the source from whom the aid was received and whether the aid was given in-kind or in-cash. All gifts from the government or non-government organizations received by the household and reported as food aid or a donation[9] makes up our measure of free distribution.[10] Most aid is received in-kind and comes in the form of wheat, maize, sorghum and cooking oil. To convert aid into cash equivalents, the amounts were first converted to kilograms and then converted to cash equivalents using local village prices.

Developing a measure of need is difficult and has been highly debated, income has been used in previous studies as a measure of need to test how well aid has been targeted [Jayne et al., 2002, Clay et al., 1999] and most studies have found that there

[9] Food aid refers to free aid not food for work.

[10] Gifts were reported at the individual level, the sum of each individual household member's aid receipts make up the household level food aid receipts. The analysis could have been done at the individual level but aid is allocated based off of the household head characteristics. From qualitative studies [Sharp, 1997] only the household head is eligible to receive aid and can only designate another household member to pick up the aid only when the head is unable to.

is little to no relationship between income and aid. The problem with interpreting the coefficient on income is that income may be endogenous, if food aid has positive health effects which may effect labor productivity or if food aid has disincentive effects. The former will lead to a positive bias in the estimate of the coefficient on income while the latter will lead to a negative bias in the estimate of the coefficient on income. There may also be random measurement error in the reporting of income which will result in attenuation bias. The net effect of these three sources of bias is ambiguous. Finding suitable instruments to deal with the endogeneity problem has proven to be challenging in that most suitable instruments may be used by the village representatives in targeting households, and it is unclear whether or not to include them in the regressions or to use them as instruments. We instrument for income with land holdings and livestock ownership, which will be discussed in more detail below. Income equals the sum of crop production, converted to cash equivalents using village level prices, income from self-employment activities, and income from wage labor.[11] Income and aid were converted to cash equivalents using village level prices and average monthly values used.

We argue that the more power a household has within the village, the higher the incentive the agent has in allocating aid to them. One of the key variables of interest, is whether or not the household head has power in the village. The round 6 survey included a module to address social interactions within the village. One of the questions ask the household head to rank how much power he has on a scale from one to nine, where one represents no power and nine represents the most power. We assume that power is normally distributed and computed an index of power that runs

[11]Income from crop production had an one year recall period (surveyed asked about the two primary agricultural seasons) and was divided by 12 to get monthly values, self-employment income and wage-labor income had a four month recall period and was divided by 4 to get monthly values.

from zero to one, which represents a household's percentile ranking of power.[12] We use power to capture any influence or power the household may have in the village, that may induce the village representatives to allocate aid to these households.

There may be concern that our measure of power is just a proxy for wealth, highly correlated with income and assets, and that the coefficient on power is not providing any additional information. Appendix A lists the top five responses household heads gave when asked what made a household powerful. The number one response was someone who is an elder, two of the top responses dealt with political connections and the other two of the top responses had to do with individual characteristics. We offer this as support that our power measure captures additional information not captured by income and assets. Because our measure of power is only available in one round, we do not know explicitly how power varies over time. We argue that since our power variable is positively correlated with all measures of wealth and our measures of wealth are correlated over time, power is time-invariant. Further, what constitutes power within villages: political connections, personality traits, etc., are not likely to vary much over time (in particular, over the ten year span they were surveyed). Additional control variables include household size, age of the household head, gender of the household head, and the fraction of children and elderly in the household.

2.5 Empirical specification

In this section, we examine the agent's allocation rule used for free distribution food aid. First, the agent decides who is eligible for food aid and then decides how much aid to allocate to each household.

[12] We first take the fraction of households within each ranking and then compute the z-score from a cumulative distribution with mean zero and standard deviation one. We then calculate the households expected z-score given their response in order to obtain the households ranking of power.

$$y_{i1} = 1[\mathbf{x_i}\delta_\mathbf{1} + v_i > 0] \tag{2.2}$$

$$y_{i2} = \mathbf{x_i}\beta_\mathbf{1} + u_i \tag{2.3}$$

where y_{i1} is the binary free distribution participation indicator, $y_{i2} \equiv log(aid)$, and x_i are household characteristics for household i. We argue that the same variables go into the decision for whether or not a household will receive aid and how much aid a household should receive once selected to receive aid, but the coefficients on each variable may be different across the two regressions.[13] Jayne et al. (2002) run the regressions above using data on a large number of nationally representative sampled households collected in 1996. The large number of districts available to Jayne et al. (2002) allows them to analyze the allocation rule across districts but because of the small number of households available within each district, prevents them from adequately investigating allocations across households. We follow the analysis provided by Dercon and Krishnan (2003) who use the first three rounds of the ERHS. Like Dercon and Krishnan (2003) we are able to investigate the role of time-varying and time-invariant information and investigate the possibility of the omitted variables problem. We add to Dercon and Krishnan's (2003) analysis by investigating the role power has in determining who receives aid and how much aid a household received. The model we want to estimate,

$$y_{it1} = 1[\mathbf{x_{it}}\delta_\mathbf{1} + c_i + v_{it} > 0] \tag{2.4}$$

[13] A tobit model would restrict the coefficients to be the same across the two models.

$$y_{it2} = \mathbf{x_{it}}\beta_{\mathbf{1}} + c_i + u_{it} \tag{2.5}$$

where now we introduce time, t, and the presence of time-invariant variables that may or may not be observable to us, c_i. The time-varying observable household characteristics include household income, gender of the household head, age of the household head, household size, and the fraction of children and elderly household members. Power is included as a time-invariant variable.

2.5.1 Income and Endogeneity

We discussed earlier about the endogeneity of income and the difficulty in obtaining suitable instruments. The purpose of our regressions is to account for all information used by the village representatives in determining who is eligible for aid and how much aid each household should receive. To account for the endogeneity of income we instrument for income using land and livestock holdings. Jayne et al. (2002) use land and livestock ownership in their regressions as extra explanatory variables. Under their specification the coefficient on income uses the variation in income which is uncorrelated with land and livestock to explain aid allocations. This specification also makes it hard to interpret the coefficient on income because of the reasons described above. The specification we use with land and livestock as instruments for income allow us to account for the endogeneity of income. Under this specification, the coefficient on income uses the variation in income which is correlated with land and livestock and captures the extent of wealth targeting. Observed income can be broken down into two parts, permanent income and transitory income. Including land and livestock in the regression allows us to estimate the response of aid to transitory shocks, unfortunately we believe that if endogeneity exists, it is due to the transitory part of income. Using permanent income as our measure of income should remedy the endogeneity problem.

Let the univariate regression be given by:

$$y = \beta_0 + \beta_1 x + \epsilon \tag{2.6}$$

and the auxiliary regression given by:

$$x = \gamma_0 + \gamma_1 z + v \tag{2.7}$$

with v and ϵ correlated and z and ϵ uncorrelated. $\hat{x} = \gamma_0 + \gamma_1 z$ is maximally correlated with z, while the second, v, is orthogonal to z. When instrumenting with z the estimate of β comes from $\hat{x}$. When including z in regression (2.6) the estimate of β comes from v. As long as land holdings and livestock ownership is exogenous then when using land and livestock as instruments, the variation in x is exogenous.[14] Our measure of land holdings comes from the first round survey in 1994[15] and livestock ownership is measured using an index for livestock ownership.

2.6 Results

In this section we present regressions describing the allocation of food aid to households. A number of specifications are tested to explore the role income plays in targeting.[16] We first present results from our probit regression. By including village fixed-effects we can only use villages with partial coverage, the probit estimates report the probability of receiving aid conditional on the village receiving aid. Second we

[14]For a more thorough discussion of instrumental variables refer to Wooldridge (2002)

[15]Unlike many countries there is very little land disparities in Ethiopia. During the land reforms that took place in 1975, land became owned by the government and was redistributed based on household size so that within villages there is very little land inequalities. Due to the government owning all land and the restrictions on the sale, the renting, and the leasing of land, there is very little activity in the land market. Because we believe that much of the temporal variation we are picking up in landholdings is due to measurement error we use only initial landholdings.

[16]We discussed earlier that there are no criteria that the Peasant Associations are required to follow in the selection of household beneficiaries. While it appears that in the villages used in our sample, the decision process is similar across the villages, we must first ensure that the behavioral equation we wish to estimate has the same parameters across villages. A chow test for poolability gives an observed F-statistic of .40. We fail to reject the hypothesis of poolability.

present results from a pooled Tobit regression[17], using only households which received aid in any of the surveyed rounds. The Tobit estimates report the amount of aid received, conditional on being selected for free aid. The Probit and Tobit regressions include village fixed-effects and time-varying village fixed-effects.

Because we believe income to be endogenous we use land and livestock ownership as identifying instruments. Table 4 present the first stage regression including all exogenous variables. Land and livestock holdings are positively correlated with income as expected. Increasing land holdings by one hectare increases income by 7.4 percent holding everything else constant, while an increase in a households livestock holdings index by one increases income by slightly more at 8.3 percent. All additional variables have the expected sign, the more power a household has the more income the household has. Female-headed households have lower income than male headed households. The more dependents in the household, as measured by the fraction of children and elderly in the household, and the larger the household size, the poorer the household. The reported F-statistic from the test that both of the coefficients on land or livestock is zero is 39.52.

2.6.1 Determinants of Food Aid Allocations: The Probability of Receiving Aid

Table 5 present probit and ivprobit results for the probability of receiving aid using the pooled data, with robust standard errors corrected for village-cluster effects. The dependent variable is a binary variable which takes on the value of one if the household received aid and zero if the household did not receive aid. Only villages with partial food aid coverage are used in the probit regression. We run a number of specifications to investigate the role income plays in how aid is allocated.

Column (1) reflects the extent of income targeting. Income is negative and sig-

[17] An F-test for the significance of household effects, yields an F-value of 0.84. We fail to reject the null hypothesis of zero household effects.

nificant at the ten percent level. This suggests that village representatives use their informational advantage to target poorer households.

Clay et al. (1999) found income to be insignificant which they attributed to a disproportionate number of female and elderly headed households receiving aid regardless of need. Column (2) investigates the role gender and age of the household head plays in aid targeting. Consistent with Clay et al.'s (1999) findings, income loses its significance and female and older household heads have a higher probability of receiving aid. The inclusion of additional control variables in the probit estimates do not change the results much, income remains insignificant, female and age are statistically positive and significant, and household size enters with a negative coefficient which is marginally significant. Power and the number of dependents do not affect the probability of receiving aid (columns (3) and (4)).

Columns (5)-(8) present the IV estimates using land and livestock holdings as identifying instruments. The IV estimates tell a slightly different story. The IV estimates of income are larger in magnitude than the probit estimates and significantly negative. The larger coefficient on income suggests that income may be measured with error or endogenous. Once we instrument for income to account for the endogeneity problem, gender and age of the household head no longer become significant. Disparities in wealth account for the large fraction of female and elderly headed households receiving aid. In the probit, without accounting for the endogeneity of income, gender and age of the household head are picking up the part of income that is endogenous which would be what one would expect if the female and elderly headed households are more vulnerable to shocks.

Adding additional controls, the estimates on income fall in magnitude but remain significant at the ten percent level. Power and the fraction of dependent household members remain insignificant while household size remains negative and significant. The results with all controls and both village and time-varying village effects provide strong support that the informational advantage that village representatives have do play a role in targeting needy households, evaluated at the mean of all other variables, households at the $25th$ percentile of log per capita income have an average probability of 60 percent of receiving aid, at the $75th$ percentile this probability falls to 32 percent. These effects are significantly larger than in Jayne et al. (2002). As mentioned above Jayne et al.'s (2002) within district sample was significantly smaller than ours which makes comparison with their results difficult.[18]

2.6.2 Determinants of Food Aid Allocations: Aid Disbursements

Table 6 presents the Tobit and IVTobit results for households which received aid over the ten year period. Each regression includes village fixed effects and time-varying village effects, with robust stand errors corrected for village-cluster effects. The dependent variable is the log of monthly aid receipts.

Consistent with previous author's findings income is insignificant. This finding could suggest that village representatives do not use their informational advantage in allocating aid to aid recipients. This finding is robust to the inclusion of additional controls. On the other hand, while income does not appear to be targeted in determine how much aid a household should receive, other household demographics do appear to be targeted. The older the household head the more aid the household receives, an increase in the age of the household head by one year, holding gender, income and household composition constant, increases the amount of aid the household receives by 1.2 percent. The larger the fraction of household members above the age of 55, the less aid the household receives. For a family of five, going from

[18]The results from a Random Effects Probit model were almost identical in sign and significance.

2 household members above the age of 55, to three household members above the age of 55, decreases the amount of aid the household receives by approximately 10 percent. The larger the fraction of household members below the age of 15, however, increases the amount of aid the household receives. Going from 2 to 3 household members below the age of 15 for a family of five, increases aid receipts by approximately 5 percent. These results could be due to different nutritional needs or food requirements by age. The IV estimates are almost identical to the pooled OLS estimates, which suggests that wealth is not used by village representatives to determine household allocations.

The model we presented above argued that there is an incentive to target wealthier and more powerful households. The results thus far have suggested that wealth is only used in determining aid recipients but not aid allocations. There are a number of stories that can explain these findings. One is that put forth by Sharp (1997), that there is a desire to allocate aid equally among all aid recipients, another, is that it is more costly and difficult to monitor how much aid a household receives than who receives aid. Strong support for the second claim would be found if we had a statistically positive coefficient on income, the wealthier aid recipients receive more aid. Another way to distinguish between the two scenarios is by determining the role power plays in aid allocations. If there is a desire to allocate aid equally, then power should be insignificant, on the other hand, if power is significant, then there is evidence against the egalitarian argument. The significant and positive coefficient on power fails to support the hypothesis that there is a desire for equal allocations across households, but supports the hypothesis that agents either have an incentive to target more powerful, influential households (conditional on them being aid recipients) or that powerful households are able to influence aid allocations. A ten percentage point change in power increases the amount of aid a household receives by almost 2 percent.

2.7 Conclusion

The effectiveness of public assistance programs depends crucially on how well the programs identify vulnerable and needy individuals in times of assistance and most importantly in times of crises. When there are information asymmetries community-based programs are favored and rightfully so because of there ability to surpass informational barriers. However little is known about how effective community-level targeting is at using its informational advantage to identify intended beneficiaries.

This paper investigated the type of information used to determine food aid receipts. The existing literature on food aid in Ethiopia shows no systematic relationship between food aid and pre-aid income. We found, in contrast, that income appeared to be used to select aid beneficiaries, however, income was not used to determine aid allocations. We provided evidence that the insignificant role of income as a discriminating factor for aid allocations was not due entirely by a tendency of village representatives to equally distribute aid. We showed that power does matter and that households which possessed more power, received more aid. This finding is of importance because many public programs, in particular food aid programs, are intended to reach the vulnerable and marginalized population, the population with the least amount of power.

These findings are consistent when implementing a program where there are differential costs in monitoring the behavior of agents, it is easier to identify who receives aid, but it becomes more difficult to identify how much aid each household received. Our findings show that agency problems may be important and that agents are more likely to distort the distribution of aid receipts than the set of aid recipients. Our study also suggests that informal structures of power within African villages can influence the extent to which food aid insulates some of the world's poorest families from agricultural shocks.

Table 2.1: Fraction of households below the poverty line by round

	Round					
Peasant Association	**Round 1 (1994)**	**Round 2/3 (1995)**	**Round 4 (1997)**	**Round 5 (1999)**	**Round 6 (2004)**	**Total**
	Frac.	Frac.	Frac.	Frac.	Frac.	Frac.
Haresaw	0.81	0.41	0.35	0.25	0.24	0.41
Geblen	0.92	0.69	0.38	0.34	0.30	0.54
Dinki	0.60	0.40	0.72	0.50	0.35	0.52
Shumsha	0.55	0.07	0.14	0.07	0.09	0.20
Adele Keke	0.10	0.12	0.07	0.08	0.35	0.14
Korodegaga	0.94	0.47	0.48	0.26	0.22	0.48
Imdibir	0.40	0.56	0.48	0.14	0.29	0.38
Aze Deboa	0.39	0.69	0.38	0.66	0.40	0.51
Gara Godo	0.65	0.84	0.74	0.36	0.37	0.59
Doma	0.70	0.60	0.49	0.21	0.28	0.47
D.B. -Milki	0.17	0.20	0.05	0.10	0.03	0.11
Total	0.53	0.40	0.35	0.24	0.23	0.36

Source: Ethiopian Rural Household Survey

Notes: Uses annual consumption per capita. Dercon and Krishnan (1998) estimated the average poverty line in rural Ethiopia in 1994 to be 600 birr per capita for food consumption.

Table 2.2: Distribution of Annual Income Per Capita and Consumption Per Capita

Village	Variable	Round 1		Round 2/3		Round 4		Round 5		Round 6	
		10th-tile	90th-tile	10th-tile	90th-tile	10th-tile	90th-tile	10th-tile	90th-tile	10th-tile	90th-tile
Haresaw	Income	0	333	28.84	282.13	27	916.78	0	237.5	23.93	231.34
	Consumption	69.87	758.69	283.33	1672.95	322.78	2815.33	365.1	1862.03	399.62	1846.17
Geblen	Income	0	214.33	35.6	224	12.73	103.93	19	95	22.5	200
	Consumption	41.83	567.31	188.15	1142.98	365.7	1759.37	187.27	1555.02	188.24	3813.28
Dinki	Income	50.86	397.67	0	358.31	53.2	367.5	9	530	106.02	909.36
	Consumption	204.31	1470.24	344.57	2074.51	205.22	997.95	283.74	2088.05	281.57	2173.38
Shumsha	Income	7.5	428.68	49.55	589.14	24	924.94	0	661.76	110.11	759.31
	Consumption	138.07	1744.85	654.63	3222.96	452.53	2652.67	659.58	3259.9	642.41	4825.18
Adele Keke	Income	48	888.89	93.4	1353.85	136.56	1324.14	141.55	1249.67	156.4	1767.33
	Consumption	525.89	3075.31	420.3	3087.95	709.12	3027.38	643.25	3242.31	219.33	2413.22
Korodegaga	Income	77.5	403	180.26	603.33	240.51	778.13	84.17	686.65	197.23	1096.94
	Consumption	92.47	530.27	266.98	1358.58	340.61	1301.2	350.75	1748.36	390.06	2092.06
Imdibir	Income	86.96	2329.79	41	917.41	78.73	1591.15	30.56	496.45	114.56	1054.02
	Consumption	302.02	1872.5	223.22	1085.44	258.31	1318.12	520.06	2054.61	413.34	1841.15
Aze Deboa	Income	48.15	373.17	72.43	737.36	104.38	703.39	82.17	667.42	54.88	991.02
	Consumption	272.7	2080.31	196.91	999.32	337.07	1905.18	230.79	953.46	319.4	2432.19
Gara Godo	Income	33.13	243.13	43.83	392.43	47.55	558.06	77.03	543.46	98.96	770.66
	Consumption	235.79	1201.42	154.63	882.85	143.7	1182.35	326.41	1562.37	279.77	3879.42
Doma	Income	55.79	826.53	6.24	355.28	52.8	562.38	20	290.67	136.83	1042.31
	Consumption	196.31	1233.96	131.75	1611.89	172.12	1614.08	373.18	3882.56	426.6	2393.22
D.B. -Milki	Income	276.5	1174	137.69	725.46	212.11	1150.58	123.81	1148.1	183.9	1433.53
	Consumption	492.36	2920.46	469.35	2405.88	773.55	3615.77	617.33	3605.92	845.29	5337.33

Source: Ethiopian Rural Survey

Notes: Income is the sum of crop production (in the previous year's harvest), wage-labor income (in the four months prior to the survey), and income from self-employment activities (in the four months prior to the survey). Income does not include gifts, receipts or any income from governmental sources. Food-for-work income has been excluded from wage-labor income which accounts for the zero annual income in Geblen for the households below the tenth percentile in Round 1. Haresaw had 54 percent of the village participate in food-for-work programs in 1994 but the exclusion of food-for-work income does not account for the zero annual income for the households below the 25th percentile. For Dinki in round 2/3 and Shumsha in round 5, free aid was received by the households reporting zero annual income. Annual consumption is the sum of food consumption (excluding gifts, consumed in the week prior to the survey) consumed from own harvest, purchased meals, and non-food items. Shaded areas represent the round a village received aid.

Table 2.3: Fraction of households receiving food aid per round

	Round					
Peasant Association	**Round 1 (1994)**	**Round 2/3 (1995)**	**Round 4 (1997)**	**Round 5 (1999)**	**Round 6 (2004)**	**Total**
	Frac.	Frac.	Frac.	Frac.	Frac.	Frac.
Haresaw	0.00	0.00	0.00	0.38	0.36	0.15
Geblen	0.00	0.88	0.64	0.28	0.61	0.48
Dinki	0.00	0.83	0.00	0.26	0.50	0.32
Shumsha	0.96	0.92	0.56	0.16	0.60	0.66
Adele Keke	0.00	0.00	0.60	0.11	0.31	0.20
Korodegaga	0.17	1.00	0.00	0.00	0.75	0.38
Imdibir	0.00	0.20	0.18	0.00	0.00	0.07
Aze Deboa	0.00	0.00	0.00	0.00	0.30	0.05
Gara Godo	0.00	0.00	0.13	0.00	0.30	0.08
Doma	0.00	0.97	0.00	0.46	0.00	0.30
D.B. -Milki	0.00	0.00	0.00	0.40	0.00	0.08
Total	0.15	0.42	0.19	0.20	0.33	0.26

Source: Ethiopian Rural Household Survey
Notes: This is self reported data from households reporting that they received food aid or donations from the government or NGO.

Table 2.4: First Stage Regression

Dependent Variable: Log Per Capita Income		
	coeff.	Std. Err.
Power	0.142*	0.076
Female head	-0.339***	0.051
age of household head	-0.002	0.002
Livestock units	0.083***	0.011
household size	-0.099***	0.012
Fraction Elder	-0.467***	0.152
Fraction Children	-0.455***	0.120
Initial Land Holdings	0.074***	0.020
Constant	3.646***	0.170
Village Dummies	Yes	
Time-Varying Village Effects	Yes	
R-squared	0.42	
Obs.	1756	
Over-identification Test		
Sargan Stat	2.38	
Sargan P-value	0.12	
F-Test		
F-Stat	39.52	
P-value	0.00	

Significance levels : $*$: 10% $**$: 5% $***$: 1%
Notes: Robust Standard Errors in Parentheses. Clustered at the village level. Includes only villages which received aid.

Table 2.5: Determinants of Food Aid Allocations: Marginal Effects From Probit

	Probit				IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Income Per Capita	-0.030*	-0.014	-0.018	-0.018	-0.286***	-0.279***	-0.192*	-0.193*
	(0.017)	(0.016)	(0.018)	(0.018)	(0.076)	(0.088)	(0.101)	(0.099)
Power				-0.012				0.012
				(0.072)				(0.058)
Female head		0.138***	0.108***	0.107***		0.004	0.016	0.016
		(0.025)	(0.027)	(0.025)		(0.048)	(0.050)	(0.050)
age of household head		0.003***	0.003**	0.003**		0.001	0.003	0.003
		(0.001)	(0.001)	(0.001)		(0.002)	(0.002)	(0.002)
household size			-0.019*	-0.019*			-0.027**	-0.027**
			(0.010)	(0.010)			(0.011)	(0.011)
Fraction Elder			-0.019	-0.019			-0.121	-0.121
			(0.083)	(0.083)			(0.088)	(0.088)
Fraction Children			0.059	0.060			-0.040	-0.040
			(0.040)	(0.039)			(0.079)	(0.078)
Village Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time-Varying Village Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.29	0.30	0.31	0.31				
Log Likelihood	-1003.10	-987.14	-983.14	-983.11	-3803.31	-3763.89	-3697.03	-3696.67
Obs.	2051	2051	2051	2051	2051	2051	2051	2051

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Robust Standard Errors in Parentheses. Clustered at the village level. Includes only villages which received aid. The table reports marginal effects as the derivative of the cumulative normal distribution at the mean of the right hand side variables; for dummies the marginal effect expressed as the discrete change from 0 to 1 is reported. Dependent variable is 1 if household received aid 0 otherwise. The log of income per capita is treated as endogenous with land holdings in 1994 and livestock units used as identifying instruments.

Table 2.6: Determinants of Food Aid Allocations: Marginal Effects From Tobit

	Tobit				IV			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Log Income PC	0.027	0.034	0.033	0.031	-0.016	-0.114	-0.022	-0.035
	(0.025)	(0.025)	(0.026)	(0.026)	(0.090)	(0.127)	(0.073)	(0.078)
Power				0.138*				0.151**
				(0.084)				(0.063)
Female head (d)		0.043	0.041	0.048		0.005	0.016	0.020
		(0.054)	(0.057)	(0.057)		(0.057)	(0.056)	(0.055)
age of hh		0.005***	0.010***	0.010***		0.005***	0.010***	0.010***
		(0.002)	(0.002)	(0.002)		(0.002)	(0.003)	(0.003)
household size			-0.020	-0.020			-0.023	-0.024
			(0.013)	(0.013)			(0.017)	(0.018)
Fraction Elder			-0.449***	-0.443***			-0.475***	-0.473***
			(0.169)	(0.169)			(0.134)	(0.130)
Fraction Children			0.132	0.135			0.103*	0.101
			(0.131)	(0.131)			(0.061)	(0.063)
Village Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time*Village Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-squared	0.21	0.21	0.21	0.21				
Log Likelihood	-2484.43	-2479.29	-2474.51	-2473.15	-4854.21	-5074.87	-4765.91	-4762.47
Obs.	1756	1756	1756	1756	1756	1795	1756	1756
Unc. Obs	1083	1083	1083	1083	1083	1122	1083	1083
Lf Cen. Obs	673	673	673	673	673	673	673	673

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Robust Standard Errors in Parentheses. Clustered at the village level. Sample only includes households which received aid at least once during the ten year survey. Dependent Variable is the log of household aid. The log of income per capita is treated as endogenous with land holdings in 1994 and livestock units used as identifying instruments.

2.8 Appendix A

Top Five Criteria for the Allocation of Aid

Village Members	**Village Representatives**
1 Old people	**1** Poor people
2 Quota for the village	**2** Old people
3 People who seem to be poor	**3** Large households
4 Disabled	**4** Disabled
5 Randomly	**5** Households with no support

Source: Ethiopian Rural Household Survey
Notes: Responses come from round 6, household heads were asked "How was free food allocated in this community?" and village representatives, which consisted of community leaders, peasant association chairmen, elders, etc., were asked "What are the criteria by which free food is allocated to members of this PA?"

Top Five Reasons for being Powerful

Powerful Households

1 Elder.

2 Personal organizational ability.

3 Peasant Association Committee.

4 Political Connections (Strong Man).

5 Personal charisma.

Source: Ethiopian Rural Household Survey

Notes: Responses come from round 3, household heads were first asked to identify the most powerful individuals in the village and then asked "The reason for being power?".

Data Description: Variables Used in the Analysis

Key Variables of Interest

lninc Household income per capita (Excludes public and private transfers).

AID Total household free food Aid.

POWER Households percentile ranking of power given respondents perceived power within the village (See Ladder).

Additional Control Variables

LADDER "Please imagine a nine-step ladder, where on the bottom, the first step, stand people who are completely without rights, and step 9, the highest step, stand those who have a lot of power. On which step are you?"

LSU Household livestock unit.

FEMALE Dummy variable 1 if head of the household is female, and 0 otherwise.

AGEHD Age of household head.

HHSIZE Household size.

FRAC_CHLD Fraction of household members below the age of 15.

FRAC_OLD Fraction of household members above the age of 55.

LAND94 Household land holdings in 1994.

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CHAPTER III

Food Aid and Adult Nutrition

3.1 Introduction

The role of food aid has played an important role in Ethiopia, and many developing countries, for disaster relief, development, and as a means to reduce vulnerability to agricultural shocks. The literature on food aid primarily falls into three categories: 1.) targeting, 2.) incentive effects, and 3.) health effects. The literature on targeting began to increase in the nineties as the availability of world food aid began to decline and concern about how well intended beneficiaries were benefiting from aid programs began to increase.[1] The literature on the dependency problems associated with aid and the incentive effects of transfers on labor supply and productivity has always been of interest to researchers and continues to be as improvements in data quality and availability increase from developing countries.

This paper departs from the literature on targeting and incentives and focuses on the effects of food aid on individual adult nutritional status, as measured by Quetelet's body mass index (BMI). Whereas many studies have looked at the nutri-

[1] A number of papers have focused on how well aid is targeted across areas and across households within the same area and which targeting mechanisms are most effective in identifying needy households (administrative versus community level targeting) (Barret (2001), Shapouri and Missiaen (1990), Zahariadis et al. (2000), Jayne et al. (2002), Clay et al. (1999) Dercon and Krishnan (2003)). There has been mixed reviews on how well aid has been targeted in Rural Ethiopia, previous studies have suggested that there are strong regional biases in targeting uncorrelated with need (Jayne et al. (2002) and Clay et al. (1999)) while household targeting was found to be marginally better than a random allocation of aid across households (Clay et al. (1999) and Dercon and Krishnan (2003)). Other papers on household targeting in Rural Ethiopia suggest that most of the targeting takes place in identifying needy households but not in distinguishing differing amounts of aid across aid recipients (Sharp (1994)).

tional status of children, very few studies have focused attention on the nutritional status of adults in developing countries with the exception being the theoretical models of nutritional-based efficiency wages.[2] These models set up the framework for understanding the importance of nutrition in poor countries because poor nutrition among potential labor market participants can lead to poverty traps if energy deficiency prevent them from participating in the labor market. In short, the structure of individual productivity in extremely poor areas, whether it is on one's own plot of land or in wage labor, heavily depends on an individual's health. Understanding the role that safety nets play in adult nutrition is an important contribution to understanding the dynamics of poverty in developing countries.

Public transfers to individuals of the household can be viewed as positive shocks and shared across household members. How aid is distributed within the household has received very little attention, but it is important to know if aid improves nutritional status and which household members benefit most from aid receipts. This is important because if aid does indeed improve nutrition then aid may also have an impact on productivity through a nutrition-productivity link (Dasgupta (1993)). In these models the relationship between nutrition and work capacity is characterized by a nonlinear relationship with work capacity a convex function of nutrition at low levels of nutrition to take into account the fact that the body requires a certain minimal amount of nutrition before productivity gains begin to kick in. This relationship between nutrition and work capacity has been used to explain inequality and unemployment in poor countries but also to explain unequal distributions within the household,[3] where it may be more efficient to allocate more resources to

[2]For a more detailed analysis see Mirrlees (1975), Stiglitz (1976) and Dasgupta and Ray (1986).

[3]These models ignore bargaining power; women with more bargaining power may demand more resources to ensure their minimal requirements are met so that they can be productive in their own activities. See Chiappori (1992);Bourguignon et al. (1993); Browning et al. (1994).

individuals who have higher market returns to nutrition. The link between nutrition and productivity highlights the tradeoff between efficiency and equity. On one hand, if resources to the household are insufficient for an acceptable standard of living unequal division of resources may exist beyond the basic fundamental differences in minimal requirements in nutrition, care, and economic resources as households allocate resources to individuals with the highest returns.[4] On the other hand, if there is a desire for equal distributions of resources then if resources are insufficient to ensure that individuals are healthy enough to be productive in the labor market, the resulting outcome will be a cycle of poverty.[5]

Current adult nutritional status depends on past investments in health, requirements for maintenance of the body, current physical activities and energy expenditures, and health endowments. While the effects of public transfers on adult nutrition is an important question, empirical testing can be complex due to heterogeneity in energy expenditure, health endowments and nutrient requirements, many of which are unobserved to the econometrician. In much of the literature on nutritional status, energy expenditures have been ignored while health endowments have been assumed the same across household members. Not controlling for individual heterogeneity may bias regression results. Using a rich panel dataset, this paper runs individual fixed effects regressions to eliminate time-invariant individual effects such as health endowments and attempts to proxy for energy expenditures and nutrient requirements with some limitations.

Food aid can play an important role in buffering the effects of adverse shocks in poor, liquidity constrained households. Public assistance primarily comes during

[4]This is known as the lifeboat problem: poor households who are liquidity constrained may have to allocated scarce resources to individuals in the household who may be most productive.

[5]The tendency to equally distribute aid receipts among aid recipients has been one argument for the apparent ineffectiveness aid in many poor African villages.

times of aggregate shocks such as droughts and most village households become eligible for assistance.[6] The impact aid has on adult household members is important because these are the members who insure the survival of the household through a number of labor intensive activities (both men and women). This paper looks at a sub-group of the household, namely adult men and women between the ages of 17 and 55, and investigates the effects that food aid has on adult nutrition. Without knowing individual consumption of aid it is impossible to access intra-household allocations directly but this paper attempts to infer distributional impacts by controlling for individual heterogeneity. For credit constrained poor households, equal distributions or distributions to non-productive household members may not be feasible [Stiglitz, 1976] and therefore the bulk of public assistances must flow to male or healthier household members. On the other hand, additional household resources, such as food aid, may flow to the least healthiest members or to members with little bargaining power. While the data does not allow for inference about how much aid is received by individuals within the household the results do allow inference about the relative impact the presence of aid resources within the household has on different household members. I use panel data from rural Ethiopia on individual nutritional status to first test whether there is an effect of public transfers on nutritional levels for adults and secondly to test whether the effect differs depending on the gender of the recipient and/or the gender of the individual.

3.1.1 Public Transfers in Ethiopia

Public transfers in Ethiopia primarily come in two forms, free distribution (FD) and food-for-work (FFW). FD is targeted towards needy households with no work

[6]This is particular true in the villages surveyed in the Ethiopian Rural Household Survey where many of the villages were selected because of the impact the 1984-1985 famine had on them and still adversely suffer from the famine and droughts that followed.

requirements whereas participants in FFW programs work on community development projects in return for a wage in the form of food. The Ethiopian government is committed to ensuring that no able-bodied person should receive food aid without working on a community project in return whereas FD should be targeted to households which do not have a person who can work. 80% of all food assistance programs are FFW.

In this paper I focus exclusively on aid that comes in the form of FD. Looking at FD as opposed to FFW is beneficial for a number of reasons.[7] First, because FFW has work requirements it is unclear how FFW will impact adult nutrition since as additional energy is being provided from the food, additional energy is being burned in the form of work requirements or as other household members take on additional tasks as the FFW participant works outside of the household. Secondly, unlike FFW, FD can be viewed as unearned income and shared among all household members. This second reason is crucial for the analysis in this paper. FD is administered based on household characteristics and is only distributed to the household head,[8] a single individual does not have claim to FD. FFW, on the other hand, depends on household and individual characteristics. The individual must be able to work and must be able to travel to the FFW site. FFW can be seen as individual wages.[9]

Although the precise mechanism for the allocation of food aid in Ethiopia remains unclear, official documents suggest that there are at least two levels at which food needs are assessed, the Wereda or district level and the household level. Members representing the government, international donors, and non-government organiza-

[7] The selection into FFW vs. FD is not of concern here because no village received both FFW and FD in the same round except for one village. The results do not change with the exclusion of this village.

[8] In some circumstances aid can be received by someone other than the household head if the head is unable to make it to the distribution center. In less than 10 cases more than one household member received aid.

[9] Quisumbing (2003) present the case that FFW can be seen as a factor that effects the individuals relative desirability of being outside of the outside. Since opportunities for women are rare in rural Ethiopia, gender-specific targeting in FFW programs can increase women's options outside of marriage.

tions conduct Wereda level assessments while representatives within villages identify needy households. Selection for aid receipts depend on household characteristics and is administered to the household head. Approximately 80% of the aid recipients were household heads and in the remaining households, aid was received primarily by the head's spouse or child and in almost every case the head was elderly or disabled. Anthropological studies for Ethiopia show that community members do have knowledge of the needs of different families (Sharp 1997), but the effectiveness with which they use this information has been debated and criticized. Many studies have found that selection into public assistance programs heavily depends on household income, with the likelihood of receiving aid decreasing the higher the household income is. On the other hand, income has been shown to play little or no role in determining how much aid recipients receive. To deal with the issue of selection into aid programs the sample consist only of households which received aid. An earlier study showed that unobservable variables correlated with wealth and power helped determine how much aid a household received. This can cause a problem with the analysis if these unobservables are correlated with health status. Consistent estimates are feasible by using fixed effects and controlling for time-varying covariates that determine aid allocations.

3.1.2 Nutrition and Productivity

There is growing interest in the relationship between health and labor market outcomes. There is a general consensus that there exist a positive relationship between health and income but drawing causal interpretations are met with a number of econometric issues.[10] The relationship between nutrition and income can be used to argue the continued role of aid programs in poor villages. In order to assess the role

[10] Refer to Strauss and Thomas (1998) for a review of the literature

of aid on nutrition there must first be an acceptable measure of nutritional status. The Quetelet body mass index (BMI) is a measure widely used to define nutritional status of adults. It is measured as weight in kilograms divided by squared height in meters. The Quetelet index has been proposed as an objective measure of chronic energy deficiency in adults.[11] Which cutoffs classifies individuals as malnourished has not been completely established but what is clear is that individuals with low Quetelet indexes are associated with decreases in work output and the inability to sustain productivity for an extended period of time. The Quetelet index has been shown to fluctuate over short horizons due to seasonal fluctuations and shocks that may effect food consumption, and there is a general consensus that large fluctuations over a short time frame are detrimental. The Quetelet index is an objective measure of adult nutrition and is believed to be highly correlated with individual food consumption.

Figures 1 through 9 show estimates of the distribution of adult BMI. Each graph shows the estimated density functions of BMI by round for the total sample, low-asset households, high-asset households and for men and women. Modal BMI is the same for both males and females and for low and high-asset households at an index of 20. Females tend to have a higher variance of BMI for each sub-group.

In this paper I use panel data on 259 households and 547 adult men and women from the first three rounds of the Ethiopian Rural Household survey. The Quetelet index is used as a measure of adult nutritional status in order for me to test the effects of food aid. The use of the Quetelet index in this paper has a number of advantages: it is easy to obtain; it does not suffer from measurement error the way other measures of nutrition are; it is closely related to individual's food consumption

[11] Chronic energy deficiency is defined as a "steady state" where an individual is in energy balance despite the low body weight and low body energy stores. Refer to Shetty and James' "Body Mass Index-A Measure of Chronic Energy Deficiency in Adults."

levels; and it is available at the individual level. The rest of the paper is as follows. Section 2 describes the data. Section 3 presents the empirical specification followed by section 4 which discusses the results. Section 5 concludes.

3.2 Data

Data comes from the first three rounds of the Ethiopian Rural Household Survey (ERHS) which interviewed 1,477 households three times between 1994 and 1995. The survey was administered by the International Food Policy Research Institute (IFPRI) in collaboration with the department of economics at Addis Ababa University (AAU) and the Center for the Study of African Economies (CSAE) at Oxford University.

The survey provides health, individual characteristics, income earned from a number of work-related activities and private or public transfers on over 9,000 adults and children. Information on consumption and assets are available at the household level. The analysis is restricted to 7 of the 15 sampled villages due to the fact that these were the only villages which received FD during the 1994-1995 survey rounds. From the 7 villages which received FD only households which received aid were used in the analysis, 388 of the 549 households received aid in at least one of the survey rounds. Of the 1065 adult individuals in the 388 households only 687 adults between the ages of 17 and 55 had complete information over the three rounds. Only households which had complete information on at least one male and one female were used in the analysis to avoid drawing conclusions on households with adults of only one sex, this left a final sample size of 285 women and 262 men across 259 households.

This paper is interested in the effects that food aid has on adult nutrition and whether the gender of the aid recipient plays a role in how aid is distributed. As mentioned earlier, aid is primarily administered to the head of the household, and comparison across gender recipients could be misleading if female headed households are different from male headed households.[12] 70 percent of female headed households are either widowed or still married. Female heads who are still married have a husband who is present in the household but is disabled or husband who has temporarily migrated for work. Widowed households can be viewed as households who are no different than male headed households but who received an unforeseen shock (the death of the male head), whereas married households whose husband is either absent or disabled are similar to other households with fewer male labor.[13] Table 1 presents descriptive statistics for the sampled households. 20 percent of the household sample are female headed households and approximately 20 percent of aid recipients were female but they did not all come from female headed households. In fact, table 1 shows that 50 percent of female recipients came from male headed households. The characteristics of households where there is a male recipient or a female recipient are very similar across the three rounds of data.

Tables 2, 3 and 4 replicates the tables from Dercon and Krishnan (2000) and presents a summary of individual BMI scores across rural Ethiopia for the sample across the three rounds and seven villages. Mean levels of BMI are between 19 and 20 which is typical in other rural areas in developing countries except for Imdibir whose mean index is as low as 16.51 for men. We are interested in how food aid buffers fluctuations in the Quetelet index. Table 2 presents the average of the minimum Quetelet index as a percentage of the maximum Quetelet index for each village for

[12] 20 percent of the sampled households are female headed. This is not an oversample of female headed households, of the full sample of households surveyed in the Ethiopian Rural Household Survey (ERHS) 20 percent were female headed.

[13] The fraction of married female headed households used in the analysis is slightly higher than the full sample of the ERHS, 30 percent compared to 20 percent, while the sample of divorced female headed households used in the analysis is slightly smaller than the full sample of the ERHS, 20 percent compared to 30 percent. Because the sample used in the analysis consists of aid recipient households it is natural to assume that village resources may flow to households which have important household members temporarily missing. For female headed households who are divorced village resources are less likely to flow to households if divorce is looked down on.

men and women. Table 2 suggests a significant amount of variability in the Quetelet index across all villages. The lowest level of the index as a percentage of the highest level is 85.98 for women and 87.02 for men. These results suggest a weight loss of $13-14$ percent over a 18 month period! These measures are lower than the measures reported in Dercon and Krishnan (2000), recall they used all 15 villages whereas the villages used in this study were some of the poorest villages, so we expect there to be a higher level of variability in nutritional status. Table 3 is of particular interest because it relates the sample used in the analysis to chronic energy deficiency. Severe malnutrition has been associated with decreased productivity. Similar to Dercon and Krishnan (2000) about a quarter of the sample is malnourished, reporting a Quetelet index below 18.5 with a significant proportion displaying a Quetelet index below 17.

Table 4 presents the contribution of food aid to monthly food consumption. In the rounds a village receives aid, food aid contributes significantly to total household food consumption. Food consumption in the form of aid is as high as 76 percent in Kordegaga to as low as 1 percent in Imdibir. Table 4 demonstrates the role that food aid can play in improving health. In this paper I will investigate the effects aid has on adult nutrition in Rural Ethiopia.

3.3 Empirical Specification

To understand food aid's indirect effect on productivity, an understanding of how aid impacts health is important.

Health status in each period can be characterized by a health production function[14] which depends on consumption, c, illness/disease, d, energy expenditure, e, household and village fixed effects, and individual health endowment, u:

[14] See Rosenzweig and Schultz (1983)

$$H_{it} = H(c_{it}, d_{it}, e_{it}, S, M, u_i) \tag{3.1}$$

With $H_c > 0$, $H_d < 0$ and $H_e < 0$.

Consumption boosts nutrition, while illness/disease and energy expenditure deplete nutrition. S and M are household and village environment factors which effect nutritional status. Consumption equals the sum of food consumption from agricultural production or purchased with wage labor income, w_{it}, and food aid, a_{it}.

If the amount of aid allocated across households was randomly distributed and individuals were identical, we could estimate the following equation by OLS:

$$H_{it} = \alpha_0 + \beta_1 a_{it} + \beta_2 w_{it} + \beta_3 e_{it} + \eta_{it} \tag{3.2}$$

For reasons described earlier aid is unlikely to be distributed randomly and individuals are not identical. If we knew all the factors effecting nutritional status in period t and control for the household factors which effect aid allocations then we can estimate:

$$H_{ijvt} = \alpha_0 + \beta_1 a_{ijvt} + \beta_2 w_{ijvt} + \beta_3 e_{ijvt} + \beta 4 s_{jt} \beta 5 m_{vt} + u_i + S_j + M_v + \eta_{ijvt} \tag{3.3}$$

where s_{jt} and m_{vt} are time-varying household and village variables respectively and S_j and M_v are time-invariant factors. Because u_i may be correlated with the other variables OLS will not give consistent estimates. For example, some household individuals may not be as vulnerable to food and income shocks as others, if this is known by the household then less aid will be allocated to those household members.

Running individual fixed-effects regression drops the time-invariant variables so that consistent estimates of β_1 can be obtained.

The dependent variable is the natural log of the Quetelet index. Table 6 summarizes the individual and household variables used in the regressions. One of the key inputs for nutritional status is individual consumption of calories. The data does not ask about individual calorie consumption and so is proxied by per capita calorie food consumption logged, consumed one week prior to the survey and scaled to a monthly value and logged per capita caloric aid receipts received since the previous round (in the previous 4 months for round 1) and converted to a monthly value. The survey asked each member of the household if they had to miss any days from their main activity in the previous 4 weeks due to illness or injury and if so how many days. The number of days missed due to illness or injury is used as a proxy for illness. A dummy variable for whether the individual is pregnant or breastfeeding. The survey does not have information about energy expenditure. Since mostly all the households in the sample are farming households and most of their energy is spent engaged in agricultural activities a proxy for energy expenditure is the number of days the individual participated in a traditional labor sharing arrangement. A labor sharing arrangement is when labor is shared across households. Variables controlling for household composition include the number of household members which are male, female, children and elderly. Additional control variables are age and age squared, logged of non-food expenditure per capita and the log of household livestock value per capita. Of particular interest is the effect that aid has on malnourished individuals (BMI below 18.5). A dummy variable was created to capture an individuals vulnerability to malnutrition by taking on the value of 1 if the individual experienced an episode of malnutrition during the three rounds.

3.3.1 Limitations

While the fixed-effects regression removes the time-invariant variables which may be correlated with the other covariates, they do not difference out unobservable time-varying village factors that may affect aid distributions and nutritional status. Using the previous example if seasons are characterized as peak and lean seasons, households may allocate fewer resources to household members who are less vulnerable to food fluctuations during lean seasons. Due to the relatively short time frame in between rounds individual adult nutrition may be vulnerable to season changes. To deal with this concern the regressions include time-varying village effects, which will capture village changes in between survey rounds (whether the survey was conducted during a lean season or post harvest).

Another concern is that the effect of food aid on productivity can go either way and because the data does not have acceptable data on productivity the coefficient on aid can be biased upward or downward. If the presence of aid programs has a negative impact on incentives then food aid can have negative consequences on productivity.[15] On the other hand, if food aid has positive effects on productivity, this would come about through food aids impact on nutrition. The relationship between aid and incentives can not be ignored if in fact aid has negative incentives effects. For example, if total food consumption (consumption from agricultural production plus food aid) does not change, but in times when food aid is present non-food aid consumption goes down by as much as food aid consumption goes up, then to infer a positive and significant coefficient on food aid (from changes in quality of the same types of goods consumed, lower energy expenditure, etc.) as a positive

[15]In fact in one of the village studies which accompanied the survey, one respondent reported that the economic condition was such that farmers were unable to "sustain subsistence due to under-production" and attributed this to the presence of free distribution and food-for-work programs. It was believed that farmers lacked the incentives to invest in new technologies because of the village's dependency on aid.

impact on health would be incorrect. While I can not rule out food aid's impact on incentives (negative or positive), as mentioned earlier many of the sampled villages have been recipients of aid since the famines of 1984 and 1985 and if there was any impact on incentives, these impacts would not be characterized by short run changes. Because the sampled periods cover approximately 18 months there is a strong case that incentives are not changing and can be ignored.

3.4 Results

Table 7 − 10 reported fixed effects results for low and high asset households. Low asset households are households whose livestock holdings are lower than the village median livestock holdings. Regressions are run separately for low and high asset households in case these household deal with shocks differently. Each table has 6 regression results. Column 2 reports results for the full sample, column 3 replicates column 2 but interacts aid receipts with the dummy for whether or not the individual ever experienced an episode of malnutrition. These regressions are repeated in columns 4 and 5 for men and in columns 6 and 7 for women.

Table 7 and 8 reports the effects of aid on individual adult nutrition. For low asset households, a ten percent increase in aid allocations increases adult nutrition by 0.04 percent for both men and women whereas for high asset households, a ten percent increase in aid allocations increases adult nutrition by 0.023 percent which appears to only effect men. For an individual with the average Quetelet index of 20 this increases their index by 0.6 points. For an individual who is slightly malnourished with an Quetelet index of 18, a 10 percent increase in FD pushes the individual into the normal range of Quetelet index.[16] Do malnourished individuals benefit

[16]Tests were run to check if aid had differential effects along the Quetelet distributions, none of the tests produced significant results.

more from aid? In low-asset households, aid has a larger impact on malnourished individuals, a ten percent increase in aid allocations increases adult nutrition by 0.06 percent. Because we do not know individual allocations of aid we can not conclude that malnourished individuals receive more aid resources.

Does gender of the recipient matter? Table 9 and 10 replicates the regressions from table 7 and 8 but now breaks up aid receipts by gender of the recipient. For low-asset households, aid still has a positive and significant effect on nutritional status regardless of the gender of the recipient. For women, it appears that aid only has an effect if the recipient is also a female. A f-test for a test that the coefficient on aid receipts from men is the same as aid receipts from women is not rejected.

3.5 Conclusion

This paper investigated the effects of food aid in the form of free distribution on adult nutrition using fixed effects regression methods. Results suggest that adult household members in low-asset households benefit from FD whereas the effect of FD on adult nutrition was not significant in high-asset households. Gender of the aid recipient did not matter, male and female recipients appeared to allocate resources the same. Results showed that malnourished individuals benefited the most from aid receipts. This could be due to more resources flowing to malnourished individuals or nutrition is more responsive to caloric consumption at lower levels of nutrition.

This analysis is important for public policy because it reveals how public assistance resources effect the nutritional status of adults. Because of the role health and productivity plays in escaping poverty it is important to evaluate not only targeting efficiencies of public assistance programs, but also the effects that safety nets play in improving the health and potential productivity of adults. If it is true that improved health increases productivity, then the results suggest that aid may have an effect on productivity through health improvements.

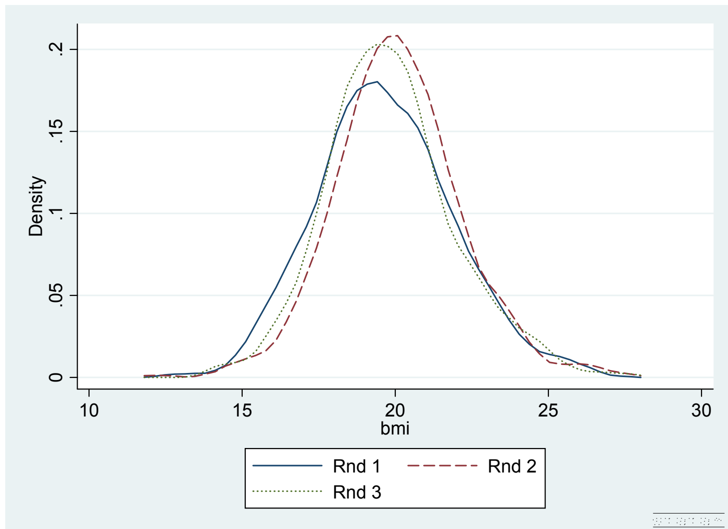

Figure 3.1: Distribution of Adult BMI: Total Sample

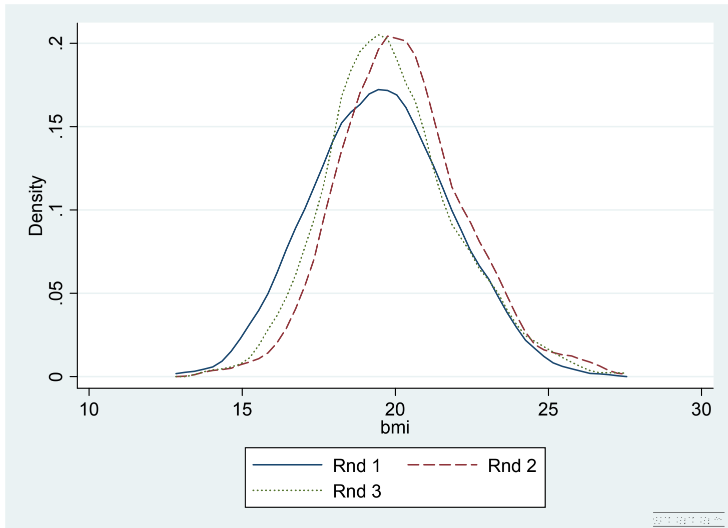

Figure 3.2: Distribution of Adult BMI: Low-Asset Households

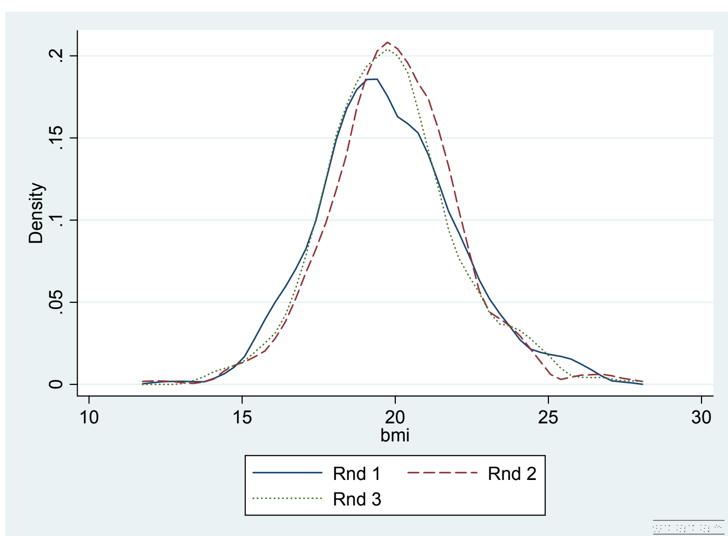

Figure 3.3: Distribution of Adult BMI: High-Asset Households

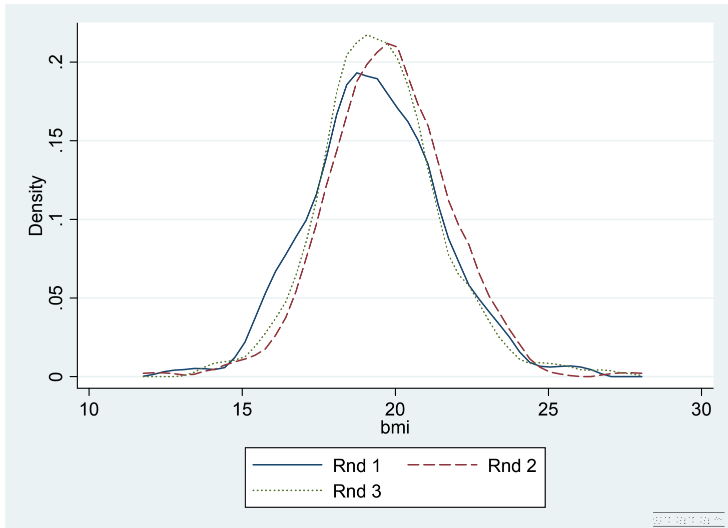

Figure 3.4: Distribution of Adult BMI: Total Male Sample

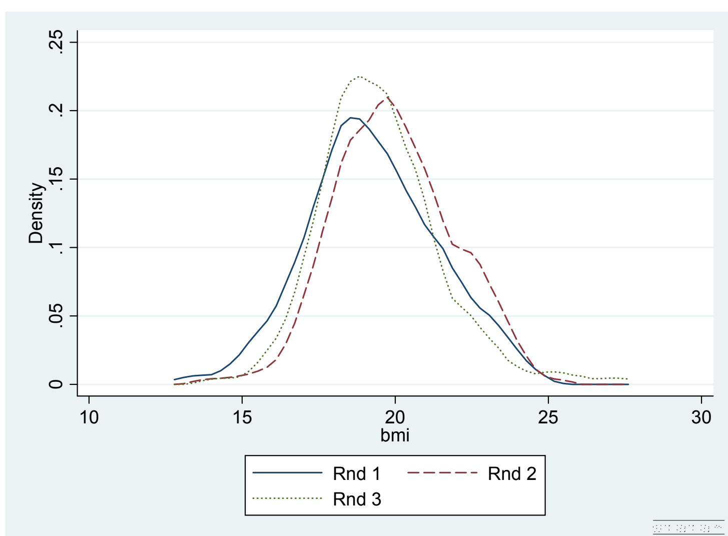

Figure 3.5: Distribution of Adult BMI: Low-Asset Households Male Sample

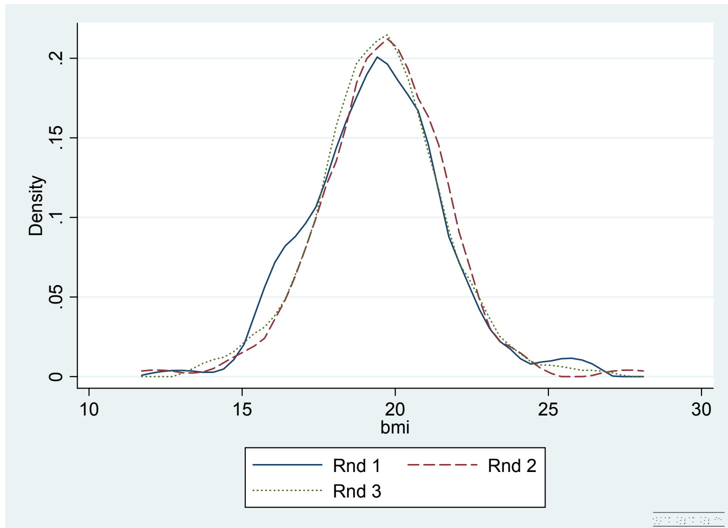

Figure 3.6: Distribution of Adult BMI: High-Asset Households Male Sample

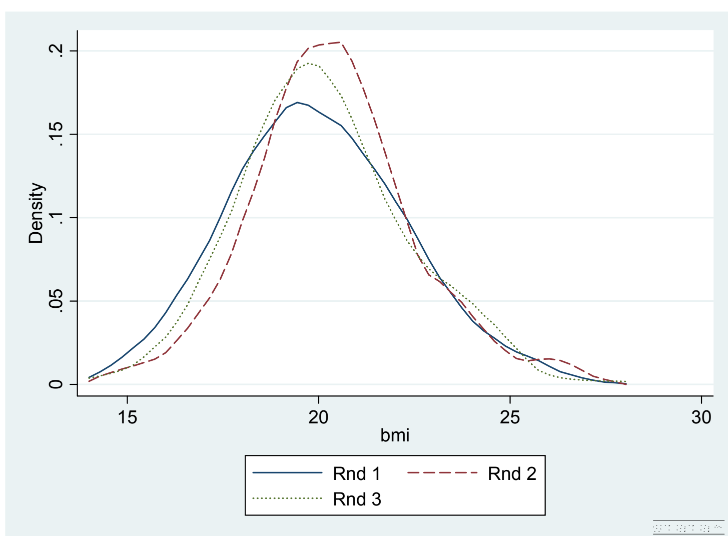

Figure 3.7: Distribution of Adult BMI: Total Female Sample

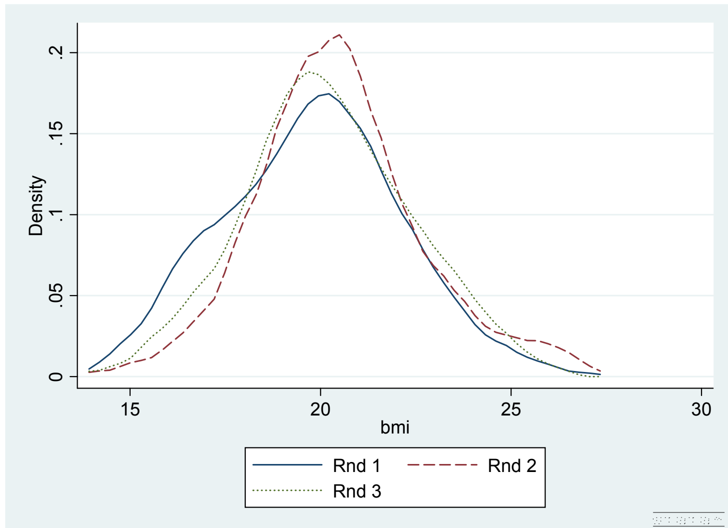

Figure 3.8: Distribution of Adult BMI: Low-Asset Households Female Sample

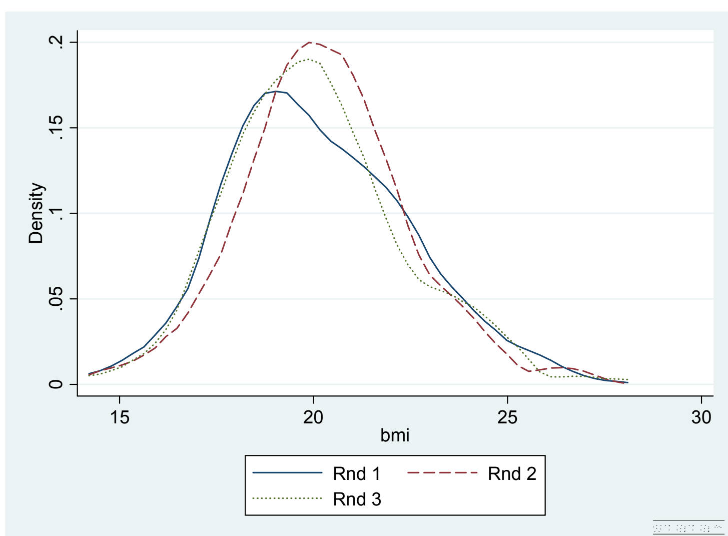

Figure 3.9: Distribution of Adult BMI: High-Asset Households Female Sample

Table 3.1: Descriptive Statistics by Gender of Recipient

	Rnd 1		Rnd 2		Rnd 3	
	Male Recipient	Female Recipient	Male Recipient	Female Recipient	Male Recipient	Female Recipient
Male Head	0.95	0.27	0.91	0.6	0.89	0.88
	(0.23)	(0.46)	(0.28)	(0.5)	(0.32)	(0.33)
Log Aid PC	9.61	8.79	9.6	9.31	8.26	7.93
	(0.7)	(3.23)	(0.92)	(5.03)	(0.57)	(0)
Log Food Cons. PC	6.9	7	10.17	11.03	9.17	9.49
	(5.05)	(4.03)	(3.41)	(1.88)	(4.24)	(3.15)
Log Non-Food Exp. PC	2.04	1.63	1.63	1.9	2.35	2.35
	(0.94)	(0.92)	(1.27)	(1.18)	(1.09)	(0.78)
Hhsize	5.64	5.07	6.17	6.47	6.25	7.36
	(1.91)	(1.83)	(2.34)	(2.85)	(2.2)	(2.34)
Log Livestock Value	5.17	5.14	4.31	4.59	5.06	3.74
	(1.97)	(2.07)	(2.49)	(2.1)	(1.64)	(2.53)

Source: Ethiopian Rural Household Survey
Notes: Sample consists of 259 households. Adults between the ages of 17 and 55. Recipient households consist of households which reported receiving aid during the the 1994-1995 survey rounds.

Table 3.2: Mean BMI Score

	rnd					
	1		2		3	
Peasant Associations	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
geblen	20.4	20.61	19.83	19.51	20.15	19.34
dinki	19.32	19.41	19.88	19.26	19.22	19.7
shumsha	20.71	21.15	20.11	21.09	20.75	21.44
korodegaga	18.68	19.79	19.29	20.57	19.17	20.18
Imdibir	16.51	18.13	18.05	19.49	17.14	18.96
doma	19.35	19.69	20.57	20.77	19.26	19.57
Total	19.34	19.99	19.78	20.38	19.5	20.13

Source: Ethiopian Rural Household Survey
Notes: Adults between the ages of 17 and 55. Sample includes 262 men and 285 women.

Table 3.3: Mean of Minimum as a percentage of Maximum

	Low-Asset Households		High-Asset Households	
Peasant Associations	**Male**	**Female**	**Male**	**Female**
geblen	91.92	91.88	92.8	88.61
dinki	87.02	87.27	88.35	85.98
shumsha	88.93	92.07	88.07	90.86
korodegaga	93.75	90.63	92.64	91.7
Imdibir	89.12	86.24	88.1	92
doma	89.18	87.22	90.69	88.83
Total	90.64	89.41	90.55	89.84

Source: Ethiopian Rural Household Survey
Notes: Adults between the ages of 17 and 55. Sample includes 262 men and 285 women.

Table 3.4: Chronic Energy Deficiency in Rural Ethiopia, 1994-95

Measure of Energy Deficiency	**rnd 1**		**2**		**3**	
	Male	Female	Male	Female	Male	Female
Normal: bmi $\geq$ 18.5	66.41	73.68	76.34	83.51	71.37	77.54
Grade I: 17 $\geq$ bmi $<$ 18.5	20.23	17.54	17.18	11.93	20.61	15.79
Grade II: 16 $\geq$ bmi $<$ 17	8.4	5.26	3.82	2.46	5.34	4.91
Grade III: bmi $<$ 16	4.96	3.51	2.67	2.11	2.67	1.75
Total	100	100	100	100	100	100

Source: Ethiopian Rural Household Survey
Notes: Adults between the ages of 17 and 55. Sample includes 262 men and 285 women.

Table 3.5: Fraction of Food Consumption in the Form of Aid

Peasant Associations	**rnd 1**	**2**	**3**	**Total**
geblen	0.00	15.65	0.00	15.65
dinki	0.00	47.29	0.00	47.29
shumsha	55.12	18.73	27.96	34.96
korodegaga	75.71	32.51	20.67	35.62
Imdibir	0.00	0.00	15.14	15.14
doma	0.00	25.34	0.00	25.34
Total	63.13	29.40	23.58	33.59

Source: Ethiopian Rural Household Survey
Notes: Sample includes 259 households. Zeros represent the round the village did not receive aid.

Table 3.6: Data Description
Variables Used in the Analysis

Individual Characteristics	
Age	Age of the Respondent.
Age Squared	Age Squared.
Lactating	Dummy variable equal to one if female is pregnant or breastfeeding.
Lost Work	The number of days in the past four weeks respondent was unable to perform their main activity.
Labor Sharing	The number of days in the past four weeks respondent participated in a traditional labor sharing arrangement.
Household Characteristics	
Log Aid Per Capita (m/f)	Amount of aid the household received since the previous survey round converted to monthly kcal value (male or female recipient).
Log Food Expenditure	Monthly household food expenditure net gifts. Equals food consumption consumed in the seven days prior to the survey round and converted to monthly kcal value.
Log NonFood Expenditure	Monthly household non-food expenditure.
Number Male	The number of household members who are male and between the ages of 17 and 55.
Number Children	The number of household members who are below the age of 17.
Number Female	The number of household member who are female and between the ages of 17 and 55.
Number Old	The number of household member who are above the age of 55.
Log Livestock Value	Value of livestock holdings per capita.
Interactive Terms	
Female	Dummy variable equal to one if the respondent is female.
Maln	Dummy equal to one if the respondent witnessed a spell of malnourishment during the survey round.
Low-Assets	Dummy equal to one if the household has lower than the median village asset holdings.

Table 3.7: Fixed-Effects Estimation of The Effects of Free Distribution on Adult Nutritional Status: Low Asset Households

	Dependent Variable: Logarithm of Quetelet Index					
(Variables)	**(Full Sample)**		**(Men)**		**(Women)**	
	(1)	(2)	(3)	(4)	(5)	(6)
Log Aid PC	0.0039***	0.0030**	0.0035**	0.0029*	0.0042*	0.0033*
	(0.0014)	(0.0014)	(0.0015)	(0.0016)	(0.0021)	(0.0020)
Maln*aid		0.0026**		0.0020*		0.0030
		(0.0011)		(0.0012)		(0.0019)
age	-0.0035	-0.0055	-0.0370	-0.0392	0.0199	0.0175
	(0.0206)	(0.0202)	(0.0272)	(0.0276)	(0.0318)	(0.0311)
agesq	0.0000	0.0000	0.0003	0.0003	-0.0002	-0.0002
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0005)
Days Not Worked	-0.0009	-0.0010	-0.0017**	-0.0017*	-0.0007	-0.0007
	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0009)	(0.0009)
Lactating	0.0245**	0.0235**	0.0000	0.0000	0.0243*	0.0228*
	(0.0115)	(0.0114)	(0.0000)	(0.0000)	(0.0124)	(0.0123)
Labor Sharing Arrg.	-0.0049*	-0.0047	-0.0068**	-0.0064**	-0.0014	
	(0.0029)	(0.0028)	(0.0030)	(0.0030)	(0.0063)	
Log Food Cons.	0.0015	0.0015*	0.0020*	0.0020*	0.0009	0.0011
	(0.0009)	(0.0009)	(0.0012)	(0.0012)	(0.0011)	(0.0012)
Log NonFood Exp.	0.0032	0.0033	0.0037	0.0040	0.0028	0.0028
	(0.0036)	(0.0036)	(0.0041)	(0.0041)	(0.0053)	(0.0054)
Log Livestock Val.	-0.0028	-0.0026	-0.0027	-0.0027	-0.0031	-0.0029
	(0.0020)	(0.0020)	(0.0030)	(0.0030)	(0.0026)	(0.0026)
Num Female	-0.0199**	-0.0181*	-0.0091	-0.0071	-0.0257*	-0.0247*
	(0.0094)	(0.0095)	(0.0110)	(0.0111)	(0.0132)	(0.0135)
Num Male	-0.0293**	-0.0293**	-0.0122	-0.0121	-0.0445***	-0.0444***
	(0.0118)	(0.0121)	(0.0146)	(0.0149)	(0.0158)	(0.0163)
Num Child	-0.0100*	-0.0097*	-0.0005	-0.0002	-0.0191**	-0.0188**
	(0.0055)	(0.0055)	(0.0063)	(0.0063)	(0.0092)	(0.0092)
Num Old	0.2122***	0.2138***	0.1162***	0.1194***	0.2944***	0.2972***
	(0.0299)	(0.0294)	(0.0423)	(0.0423)	(0.0427)	(0.0426)
Constant	3.0599***	3.1317***	3.7913***	3.8907***	2.5874***	2.6498***
	(0.4312)	(0.4194)	(0.5748)	(0.5800)	(0.6572)	(0.6252)
Time-Varying Village Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.21	0.22	0.30	0.31	0.20	0.21
Obs.	762	762	369	369	393	393
Groups	254	254	123	123	131	131

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55 for which complete data was available for all three rounds. Only includes households which had complete information for at least one male and one female. Low Asset households consists of households whose value of livestock holdings are less than the village median.

Table 3.8: Fixed-Effects Estimation of The Effects of Free Distribution on Adult Nutritional Status: High Asset Households

	Dependent Variable: Logarithm of Quetelet Index					
(Variables)	**(Full Sample)**		**(Men)**		**(Women)**	
	(1)	(2)	(3)	(4)	(5)	(6)
Log Aid PC	0.0023*	0.0017	0.0030*	0.0020	0.0015	0.0013
	(0.0012)	(0.0012)	(0.0016)	(0.0016)	(0.0014)	(0.0015)
Maln*aid		0.0015		0.0022		0.0007
		(0.0010)		(0.0014)		(0.0012)
age	0.0117	0.0095	0.0158	0.0178	0.0136	0.0131
	(0.0243)	(0.0245)	(0.0390)	(0.0393)	(0.0275)	(0.0280)
agesq	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0003
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Days Not Worked	-0.0013**	-0.0013**	0.0002	0.0002	-0.0022***	-0.0022***
	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0008)	(0.0008)
Lactating	0.0198*	0.0193*	0.0000	0.0000	0.0224*	0.0225*
	(0.0102)	(0.0102)	(0.0000)	(0.0000)	(0.0115)	(0.0115)
Labor Sharing Arrg.	-0.0003	-0.0003	-0.0032	-0.0033	0.0050	
	(0.0046)	(0.0046)	(0.0048)	(0.0047)	(0.0041)	
Log Food Cons.	-0.0008	-0.0008	-0.0015	-0.0014	0.0000	0.0000
	(0.0008)	(0.0008)	(0.0014)	(0.0014)	(0.0009)	(0.0009)
Log NonFood Exp.	0.0042	0.0040	0.0023	0.0022	0.0056	0.0058
	(0.0031)	(0.0031)	(0.0047)	(0.0047)	(0.0049)	(0.0049)
Log Livestock Val.	0.0084	0.0090	0.0173	0.0182	-0.0020	-0.0020
	(0.0128)	(0.0129)	(0.0186)	(0.0188)	(0.0165)	(0.0165)
Num Female	-0.0191*	-0.0183	-0.0139	-0.0137	-0.0239	-0.0212
	(0.0114)	(0.0116)	(0.0120)	(0.0122)	(0.0164)	(0.0155)
Num Male	0.0132*	0.0138*	0.0152	0.0168	0.0131	0.0128
	(0.0077)	(0.0076)	(0.0117)	(0.0114)	(0.0092)	(0.0090)
Num Child	0.0029	0.0030	0.0097	0.0091	-0.0012	-0.0016
	(0.0050)	(0.0050)	(0.0088)	(0.0089)	(0.0066)	(0.0065)
Num Old	0.0330**	0.0327**	0.0122	0.0137	0.0407**	0.0393**
	(0.0131)	(0.0135)	(0.0152)	(0.0159)	(0.0186)	(0.0187)
Constant	2.7060***	2.7713***	2.5011***	2.4837***	2.8296***	2.8554***
	(0.5462)	(0.5539)	(0.8856)	(0.8888)	(0.6105)	(0.6319)
Time-Varying Village Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.11	0.12	0.11	0.12	0.17	0.17
Obs.	879	879	417	417	462	462
Groups	293	293	139	139	154	154

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55 for which complete data was available for all three rounds. Only includes households which had complete information for at least one male and one female. High Asset households consists of households whose value of livestock holdings are greater than the village median.

Table 3.9: Fixed-Effects Estimation of The Effects of Free Distribution on Adult Nutritional Status: Gender of Recipient, Low Asset Households

	Dependent Variable: Logarithm of Quetelet Index					
(Variables)	**(Full Sample)**		**(Men)**		**(Women)**	
	(1)	(2)	(3)	(4)	(5)	(6)
lnaidfpc	0.0038***	0.0022	0.0042**	0.0027	0.0035**	0.0017
	(0.0012)	(0.0014)	(0.0018)	(0.0023)	(0.0017)	(0.0016)
Maln*aid (Female Rec)		0.0040**		0.0038		0.0045*
		(0.0017)		(0.0029)		(0.0027)
lnaidmpc	0.0027*	0.0021	0.0034**	0.0029**	0.0021	0.0015
	(0.0014)	(0.0014)	(0.0013)	(0.0014)	(0.0020)	(0.0020)
Maln*aid (Male Rec)		0.0020*		0.0018		0.0019
		(0.0011)		(0.0012)		(0.0019)
age	-0.0040	-0.0059	-0.0364	-0.0395	0.0182	0.0177
	(0.0205)	(0.0201)	(0.0264)	(0.0269)	(0.0314)	(0.0314)
agesq	0.0000	0.0000	0.0003	0.0003	-0.0002	-0.0002
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Days Not Worked	-0.0009	-0.0009	-0.0017*	-0.0017*	-0.0006	-0.0006
	(0.0006)	(0.0006)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Lactating	0.0236**	0.0233**	0.0000	0.0000	0.0227*	0.0226*
	(0.0115)	(0.0114)	(0.0000)	(0.0000)	(0.0124)	(0.0124)
Labor Sharing Arrg.	-0.0051*	-0.0047	-0.0071**	-0.0066**		
	(0.0029)	(0.0029)	(0.0030)	(0.0031)		
Log Food Cons.	-0.0008	-0.0008	-0.0016	-0.0013	-0.0000	-0.0000
	(0.0008)	(0.0008)	(0.0014)	(0.0014)	(0.0009)	(0.0010)
Log NonFood Exp.	0.0045	0.0044	0.0030	0.0029	0.0060	0.0059
	(0.0032)	(0.0032)	(0.0048)	(0.0048)	(0.0049)	(0.0049)
Log Livestock Val.	0.0107	0.0121	0.0214	0.0230	-0.0015	-0.0006
	(0.0125)	(0.0123)	(0.0183)	(0.0179)	(0.0163)	(0.0163)
Num Female	-0.0191*	-0.0187	-0.0137	-0.0141	-0.0216	-0.0214
	(0.0114)	(0.0116)	(0.0118)	(0.0123)	(0.0156)	(0.0158)
Num Male	0.0130*	0.0143*	0.0153	0.0192	0.0122	0.0123
	(0.0076)	(0.0076)	(0.0114)	(0.0118)	(0.0091)	(0.0091)
Num Child	0.0037	0.0039	0.0115	0.0118	-0.0016	-0.0016
	(0.0049)	(0.0048)	(0.0085)	(0.0085)	(0.0065)	(0.0065)
Num Old	0.0323**	0.0323**	0.0096	0.0109	0.0388**	0.0386**
	(0.0130)	(0.0138)	(0.0149)	(0.0156)	(0.0185)	(0.0192)
Constant	2.6527***	2.6531***	2.4843***	2.3448***	2.7473***	2.7940***
	(0.5364)	(0.5400)	(0.8792)	(0.8767)	(0.6023)	(0.6179)
Time-Varying Village Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.11	0.12	0.12	0.13	0.17	0.17
Obs.	879	879	417	417	462	462
Groups	293	293	139	139	154	154

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55 for which complete data was available for all three rounds. Only includes households which had complete information for at least one male and one female. Low Asset households consists of households whose value of livestock holdings are less than the village median.

Table 3.10: Fixed-Effects Estimation of The Effects of Free Distribution on Adult Nutritional Status: Gender of Recipient, High Asset Households

	Dependent Variable: Logarithm of Quetelet Index					
(Variables)	**(Full Sample)**		**(Men)**		**(Women)**	
	(1)	(2)	(3)	(4)	(5)	(6)
lnaidfpc	-0.0004	0.0007	-0.0012	0.0001	0.0001	0.0008
	(0.0008)	(0.0010)	(0.0013)	(0.0009)	(0.0012)	(0.0016)
Maln*aid (Female Rec)		-0.0026		-0.0033		-0.0016
		(0.0023)		(0.0033)		(0.0029)
lnaidmpc	0.0021*	0.0014	0.0033**	0.0020	0.0008	0.0005
	(0.0012)	(0.0011)	(0.0016)	(0.0015)	(0.0017)	(0.0017)
Maln*aid (Male Rec)		0.0020**		0.0029**		0.0012
		(0.0010)		(0.0014)		(0.0014)
age	0.0137	0.0142	0.0137	0.0201	0.0181	0.0164
	(0.0240)	(0.0241)	(0.0390)	(0.0390)	(0.0267)	(0.0272)
agesq	-0.0002	-0.0002	-0.0001	-0.0002	-0.0003	-0.0003
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Days Not Worked	-0.0013**	-0.0013**	0.0003	0.0003	-0.0023***	-0.0023***
	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0008)	(0.0008)
Lactating	0.0195*	0.0200*	0.0000	0.0000	0.0226**	0.0228*
	(0.0102)	(0.0103)	(0.0000)	(0.0000)	(0.0114)	(0.0116)
Labor Sharing Arrg.	-0.0005	-0.0006	-0.0044	-0.0049		
	(0.0047)	(0.0048)	(0.0049)	(0.0049)		
Log Food Cons.	-0.0008	-0.0008	-0.0016	-0.0013	0.0009	-0.0000
	(0.0008)	(0.0008)	(0.0014)	(0.0014)	(0.0011)	(0.0010)
Log NonFood Exp.	0.0045	0.0044	0.0030	0.0029	0.0024	0.0059
	(0.0032)	(0.0032)	(0.0048)	(0.0048)	(0.0054)	(0.0049)
Log Livestock Val.	0.0107	0.0121	0.0214	0.0230	-0.0030	-0.0006
	(0.0125)	(0.0123)	(0.0183)	(0.0179)	(0.0026)	(0.0163)
Num Female	-0.0191*	-0.0187	-0.0137	-0.0141	-0.0274**	-0.0214
	(0.0114)	(0.0116)	(0.0118)	(0.0123)	(0.0135)	(0.0158)
Num Male	0.0130*	0.0143*	0.0153	0.0192	-0.0407**	0.0123
	(0.0076)	(0.0076)	(0.0114)	(0.0118)	(0.0162)	(0.0091)
Num Child	0.0037	0.0039	0.0115	0.0118	-0.0194**	-0.0016
	(0.0049)	(0.0048)	(0.0085)	(0.0085)	(0.0094)	(0.0065)
Num Old	0.0323**	0.0323**	0.0096	0.0109	0.2913***	0.0386**
	(0.0130)	(0.0138)	(0.0149)	(0.0156)	(0.0438)	(0.0192)
Constant	2.6527***	2.6531***	2.4843***	2.3448***	2.6481***	2.7940***
	(0.5364)	(0.5400)	(0.8792)	(0.8767)	(0.6358)	(0.6179)
Time-Varying Village Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.11	0.12	0.12	0.13	0.20	0.17
Obs.	879	879	417	417	393	462
Groups	293	293	139	139	131	154

Significance levels : $*$: 10% $**$: 5% $***$: 1%

Notes: Clustered at the household level. Sample includes adults between the ages of 17 and 55 for which complete data was available for all three rounds. Only includes households which had complete information for at least one male and one female. High Asset households consists of households whose value of livestock holdings are greater than the village median.

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CHAPTER IV

(Why) Do Self-Employed Parents Have More Children?

4.1 Introduction

It is well known that agents facing risk and uncertainty on their own find it optimal to seek arrangements to mitigate that risk. These arrangements could be market based, such as insurance schemes, which could be privately or publicly-provided. But, it is also well known that such schemes are never complete, as agency problems and other types of frictions preclude the provision of full insurance. As a result, agents continue to seek other forms of insurance, despite the exclusivity clauses in many of the formal insurance contracts. These other forms of arrangements, which are typically referred to as non-market arrangements, fall outside the market-based ones, and are used to complete or to substitute for the presence or lack thereof of market based insurance schemes. For example, family co-insurance arrangements, which include *inter-vivos* transfers as well as bequests, familial loans and other forms of financial assistance, are typically geared to assist family members in need – for example, see Cox (1987), Arnott and Stiglitz (1991), Altig and Davis (1992), and Bernheim and Kolikoff (2001).

Implicit in these non-market arrangements, however, is the assumption that somehow the agents involved in the co-insurance arrangements find it optimal to adhere to their promises, which are normally made *ex-ante*. That is, it is possible that promises of help made before an accident, are reneged on after the fact. Or, the presence of such transfers may induce moral hazard type problems, leading to the failure of such arrangements. Thus, the question is what mitigates such situations? Arnott and Stiglitz (1991) suggest ‘peer monitoring’ as one mechanism through which agency problems among co-insuring agents can be mitigated. Chami and Fischer (1996) show that trust may preclude the need for costly monitoring, as trust does away with the gains from such type of externalities. But trust or mutual caring are only important here in the sense that they insure that agents through such sentiments can find a match, that is a person who shares their views, ideals, or their preferences, which would help reduce the agency problem, and preclude costly negotiations or the need for monitoring. But, the question now is how can one be sure of finding that agent who shares similar preferences?

In this paper, we explore this insight further in the context of self-employed agents. Such individuals present a natural example of individuals facing risk on their own, and who are in need of finding ways of mitigating such needs. One way could be through marriage. Recently, Chami and Hess (2002) and Hess (2004) explore theoretical and empirical aspects of individuals who attempt to offset idiosyncratic risk to their incomes by marrying hedges.

Another way in which risks to a family could be offset would be through procreation! The latter is easier to see in the context of a farmer facing risk, and where having children help mitigate that risk. Typically, the explanation given is that farmers view children as assets. They help in farming, among the other tasks that are not easily market substitutable. Indeed, Dasgupta (1995) provides a number of examples linking the relationship between population growth and economic incentives and activity in developing economies.

There is, however, another compelling reason as to why farmers, like other self-employed agents may decide to have more children. Farmers, like other family-business owners, share a very important concern, unlike other economic agents, who are employed in the market place. They are concerned with insuring that the farm or family-owned business continues and prospers, even after they are gone. Thus, succession is a major factor that motivates founders to choose a single child to inherit the business. Having more children, despite its costs, would go a long way to finding that person who shares the parents love for the business, or in other words, is as close as possible to a perfect match. It is estimated that in the US and most western economies, more than 75 % of all family firms are transferred to one child (see Gersick et. al. 1997), and that number is much higher in developing economies. Thus the business is not looked on as wealth to be shared equally among the siblings. In many cases, the parent chooses one child to run the business, where the other members are given side payments, but are not involved in managing the business – e.g., see the famous Vanderbilt case described in Clark (1966). Moreover, this motive for choosing an heir is not altruistically motivated; rather it is purely predicated on the presumption that the child with the closest match to the parent, would ensure the continued success of the business. Such a move would, in turn, maximize the value of the firm to the parent/owner, and perhaps even to his or her children if a bequest is made.

The outline of the paper is as follows. In section 4.2 we present a theory whereby self-employed households choose their consumption plans as well as their family size, and we empirically analyze the predictions in Section 4.3. More specifically, in sub-Section 4.3.1 we describe the data used in this study, and in sub-Section 4.3.2 we provide simple tests of the differences in means and regression analysis to test whether self-employed parents have more children. As well, we explore in sub-Section 4.3.3 some additional issues that might affect our results on self-employment status and family size.

4.2 Theory

We now consider a model of a self-employed individual's decision to have children. In particular, we consider a theory based on a parent's non-benevolent behavior.[1] In the model, every individual born is endowed with an idea in period 0. Some are promising, while others are not. Let s be the percentage of the population that is endowed with a good idea, and $1 - s$ be the fraction of the population that is not. Assume that those endowed without promising ideas can derive a living of $\overline{V}$ from a firm during their period 1 working lives. Such income is, for simplicity, assumed to be certain. Consumption in period 1 is supported by income less net-savings and the costs of child rearing, while net-savings supports consumption in period 2. More specifically, consumption in periods 1, c_1, and 2, c_2, equal:

$$c_1 = \overline{V} - a - \alpha \cdot n \text{ and } c_2 = a$$

where n is the number of children and α is the per-child cost of raising a child. For simplicity, the rate of return on net-savings (a) is set equal to zero.

Alternatively, those born with a promising idea can choose to start their own firms and reap a potential surplus. Unfortunately, the potential rewards from a start-up business with promising ideas do not come free – it requires a start-up expense to

[1] The assumption of non-benevolence is made for simplicity. The model's main prediction, namely that self-employed parents have more children, can be shown to work with a standard model of benevolence to their children. This is so because the key mechanism, whereby having more children raises the parent's expected value of the business through an increased likelihood of a good match, remains in place even with benevolence. Indeed, benevolence may magnify the effect as the enhanced financial prospects will raise the parents per-child gift. Mulligan (1997) examines the interaction between the parent's altruism and fertility choice, in a model where both fertility and altruism are endogenous – also see the earlier work by Barro and Becker (1989).

be paid in period one, and the value of the good idea is not known until period 2 when the business must be sold to provide the individual with retirement income. Let $\omega > 0$ be the start-up cost of a new business, and let $\tilde{V}$ be the uncertain value of his promising idea in period 1 when of working age. To make matters simple, let the business yield $\overline{V}$ in period 1 with a potential surplus in period 2.[2] Period 1 consumption is supported by business income less any net savings and the cost of having children, namely:

$$c_1 = \overline{V} - \omega - a - \alpha \cdot n$$

In the second period, the self-employed business person attempts to support his second period consumption by selling the potential surplus created from his business in the second period to a member of the next generation – e.g. a child. But at what price? Let ϕ be the true value of the business's surplus worth if the business owner finds the right person who sees the value. However, as noted above, the key to a family business is that with the insider's valuation of the business being private information, it is unlikely that an outsider 's valuation of the business's surplus is worth more than 0. Why? Outsiders know that the family has private information about the business that may not be currently observed or easily quantified.[3] As a consequence, outsiders will not want to pay for the business's surplus – a premium for the business. Of course, an inside family member may also not see the true value of the firm. To capture this phenomenon, let us assume that with probability $1 - p$ the self-employed business owner does not find an insider or outsider match that sees the full value of the business. Hence, if the business owner does not find a match,

[2]Note that it must be incentive compatible for the individual with a promising idea to be willing to undertake a start-up. This can be achieved by lowering the start-up cost, ω relative to the expected surplus, $\lambda\phi$, described below.

[3]While the policymakers are currently enthralled with accounting irregularities in large publicly traded companies, the problem could be much worse in privately-held, family businesses – e.g. chaebols in South Korea. Tax evasion and under-the-table payments may also be a formidable factor for self-employed businesses. As such, the market value of these privately held firms may be extremely difficult for outsiders to determine, though less so for family insiders.

the value of his firm's surplus is 0 in period 2. Alternatively, with probability p the business owner may find an insider or an outsider who has the skills needed to see the business's full potential or true value. Consistent with observed facts, we assume that the business owner sells it to just one individual and that the owner and purchaser share the surplus. Since the individual who buys the business will also be endowed with some ideas of his own, the sale price of the business is $\phi\lambda$, where λ is the fraction of the surplus that the firm owner keeps.

To recap, there are two possible outcomes for the business owner in period 2. If he has a promising idea but does not match with someone who sees the value, then $c_2^{NM} = a$. Finally, if he has a promising idea and finds a match then $c_2^M = a + \phi\lambda$. Taken together, the self-employed households decision is to choose the number of children and the amount of net savings to maximize welfare:

$$\max_{\{n,a\}} W = \theta \cdot n + U(c_1) + (1-p) \cdot U(c_2^{NM}) + p \cdot U(c_2^M) \tag{4.1}$$

where θ represents a household's exogenous and random preference for children, $U'(.) > 0$, $U''(.) < 0$ and $c_2^M > c_2^{NM}$.

As mentioned above, these potential matches and the sale of a business are available only to the fraction of the population, s, that are born with promising ideas. By comparison, the fraction of the population $1-s$ who are born without promising ideas can be thought of as individuals where the probability p is zero of ever finding a promising match for expression (4.1). Notice that since starting a new business involves a start-up cost, and since those who start out working lives without promising ideas do not have a chance to reap any surplus, only those born with promising ideas will attempt to start a business on their own. Of course, to insure that individuals with promising ideas are willing to start their own businesses, it must be that the expected return to doing so $(\phi \cdot \lambda)$ is sufficiently large relative to the start-up cost ω.

The key to the model is that the probability of finding a match, p, may be affected by family size. Consider the following components that go into the probability of an owner of a family business finding a match. Let γ_0, $0 \leq \gamma_0 \leq 1$, be the probability that the business owner is approached by an outsider, who has enough expertise and knowledge to see the true inside value of the firm. Furthermore, let γ_1, $0 \leq \gamma_1 \leq 1$, be the per-child probability that a business owner's progeny sees the true value of the firm. For example, if a business owner has a good business but no children, his chance of finding a match is γ_0. If he has one child it is $1-(1-\gamma_0)\cdot(1-\gamma_1)$. With two children, the probability of a match is $1-(1-\gamma_0)\cdot(1-\gamma_1)^2$. More generally, for "n" number of children, the probability of finding a match is:

$$p(n) = 1-(1-\gamma_0)\cdot(1-\gamma_1)^n$$

Note that $p(n)$ is increasing in γ_0, γ_1, and n, where $p'(n) = -(1-\gamma_0)\cdot(1-\gamma_1)^n \cdot log(1-\gamma_1) \geq 0$, where the equation holds with equality only if $\gamma_1 = 0$ or $\gamma_0 = 1$.[4] Note that if $\gamma_1 = 0$, then the probability of a match is constant and independent of n.

The optimality condition for a turns out to be the standard relationship where the business owner equates the marginal utility from consumption in period 1 with the expected marginal utility from consuming in period 2: namely,

$$U'(c_1) - (1-p(n))\cdot U'(c_2^{NM}) - p(n)\cdot U'(c_2^{M}) = 0 \tag{4.2}$$

The optimality condition for the number of children, n, is the following:

$$\theta - \alpha \cdot U'(c_1) + p'(n)\cdot \left\{U(c_2^{M}) - U(c_2^{NM})\right\} = 0 \tag{4.3}$$

The first two terms of equation (4.3) represent the standard marginal benefit and marginal cost of having children. The final term, reflects the positive impact that

[4] Note that: $dp(n)/d\gamma_1 = +(1-\gamma_0)\cdot n\cdot(1-\gamma_1)^{n-1} > 0$.

having more children has on making a a positive business match. Note that if having more children does not help in matching, then $\gamma_1 = 0$ and $p'(n) = 0$, so that the last term vanishes.

The key proposition that we want to show is that if having more children increases your ability to obtain a good match, then self-employed people will have more of them. There are two distinct effects. The first is the direct effect of how γ_1 affects the optimality condition for the optimal choice of the number of children, expression (4.3). It is straightforward to see that this direct effect will be positive: from the optimality condition for the number of children, expression (4.3), the marginal benefit for having more children rises as long as $p'(n) > 0$. In other words, if having more children makes it easier to find a successful match, this will raise the desire to have more children. The second effect is to see how the choice of n is indirectly affected by a change in γ_1 that affects the optimal choice of net-savings in the intertemporal consumption smoothing decision, expression (4.2). Namely,

$$\left[\frac{dn}{d\gamma_1}\right] = \left[\frac{\partial n}{\partial \gamma_1}\right] + \left[\frac{\partial n}{\partial a}\right] \cdot \left[\frac{\partial a}{\partial \gamma_1}\right]$$

Linearizing the system of two unknowns, n and a, and two equations, (4.2) and (4.3), and differentiating with respect to γ_1, in the neighborhood of $\gamma_1 = 0$, the total effect is:

$$\begin{aligned}\left[\frac{dn}{d\gamma_1}\right]\Big|_{\gamma_1=0} = \; & \Big\{-\left[U''(c_1) + pU''(c_2^M) + (1-p)U''(c_2^{NM})\right] \cdot \left[(\partial p'(n)/\partial\gamma_1)\left\{U(c_2^M) - U(c_2^{NM})\right\}\right] \\ & + \left[(\partial p(n)/\partial\gamma_1)\left\{U'(c_2^M) - U'(c_2^{NM})\right\}\right] \cdot \left[\alpha U''(c_1) + p'(n)\left\{U'(c_2^M) - U'(c_2^{NM})\right\}\right]\Big\} / \\ & \left\{\left[pU''(c_2^M) + (1-p)U''(c_2^{NM})\right] \cdot \left[\alpha^2 U''(c_1)\right]\right\} > 0 \end{aligned} \tag{4.4}$$

Critical to signing the effect is to note that $\partial p'(n)/\partial\gamma_1 > 0$ for $1 > \gamma_1 \geq 0$. [5] It is straightforward to show that the numerator and denominator are both positive, so that $dn/d\gamma_1|_{\gamma_1=0} > 0$.

[5] Note that

$$p''(n) = -(1-\gamma_0) \cdot (log(1-\gamma_1))^2 \cdot (1-\gamma_1)^n < 0,$$
$$\partial p'(n)/\partial\gamma_1 = (1-\gamma_0) \cdot (1-\gamma_1)^{n-1} \cdot (1 - n \cdot log(1-\gamma_1)) > 0.$$

While the above model provides the important prediction that individuals who are self-employed will want to have more children than they would if they were not self-employed, it did so by assuming non-benevolence to their children. As alluded to in footnote 1, this assumption allows us to present the prediction in the simplest model possible. Indeed, while the optimal number of children would take into account all the standard costs and benefits to the decision maker of having an additional child (i.e. child rearing costs, the non-pecuniary utility benefit from having children, the cost an extra child on watering down the per-child bequest, etc...), the fact remains that as long as self-employed individuals have an additional matching benefit for having children, that is increasing the likelihood of the business's succession, they will choose to have more children. As such, the theory's prediction can be shown to hold for model's with explicit bequests and benevolent parents.[6]

4.3 Empirical Analysis

The theoretical model presented above provides a strong prediction: namely, that individuals who own businesses will have larger preferred family sizes. However, we are confronted with a number of practical issues when implementing an empirical test of this prediction. First, most data sets do not comprehensively ask questions about whether an individual is part of a family business.[7] However, a type of family business that is consistently and comprehensively recorded in the annual General Social Survey (GSS) is whether the respondent is self-employed. From the perspective of our model, self-employment captures the main features we are attempting to proxy

[6] In a related paper, Bernheim, Schleifer and Summers (1985) explore the theoretical and empirical aspects of a strategic bequest motive where parents condition their bequests on the actions of their children's actions. Our strategic motive in this paper, endogenizing the number of children, is complementary to their strategic bequest motive. See Chami (2001) for an extensive theoretical treatment of the issues surrounding strategic bequests and family businesses.

[7] This shortcoming is shared by the standard data sets that one might consider to use for testing our prediction – i.e. the the Panel Study of Income Dynamics (PSID), the National Longitudinal Survey of Youth (NLSY) and the General Social Survey (GSS), as either the question is limited to a specific age group, or the question changes, or is just asked in a few years.

in a potential family business: namely, an individual who owns a business and who at some point would benefit from selling the business off to either an outsider or an inside family member.[8] Hence, we use self-employment status throughout the empirical work below to proxy the type of individual who owns a business and whose preferred family size may be influenced by the factors identified in our theory.

Second, there exists the possibility that the empirical work below, which attempts to identify how self-employment status may affect the respondent's preferred number of children, suffers from some type of reverse causality. In other words, perhaps individuals who prefer larger family sizes decide to choose self-employment over working for some other business. While we cannot ignore this possibility, we adopt a few measures to help ensure that this problem does not cloud our findings. More importantly, we provide instrumental variables estimates which should help overcome any endogeneity bias from our estimated effect of self-employment status on the respondent's actual and expected number of children. As well, we provide additional evidence in sub-section 4.3.3 that indicates that respondents who are self-employed work more hours and do not seem to have more "family friendly" jobs as compared to workers who are not self-employed. As such, this would suggest that self-employment status may not be a good haven for workers with lots of children as a way to better fit their work into their family lives.

[8]Interestingly, in 1996 the GSS did ask whether the respondent was a member of a family business. The question asked, "Do you work for pay in a farm or other business owned in whole or in substantial part by a member or members of your family (parents, grandparents, children, brothers, sisters, aunts, uncles, or first cousins?" 54 respondents answered yes, while 1381 responded no. Of the 54 who said yes, about half answered that they were self-employed. Note that whether an individual works for a family business is not quite the right question for what we are looking for. For instance, a respondent who works for a family firm and does not own it (or never anticipates owning it) would respond 'Yes' to the question of working for a family firm, would likely answer 'No' to being self-employed, and nevertheless would not, according to our line of theory, want to have more children. As this demonstrates, responses to the self-employment question are likely to be a better proxy for the incentives of an owner of a family business as compared to the family business question itself.

4.3.1 The Data

In this section, we begin by describing the data employed in the paper. The GSS is an annual survey which asks respondents specific questions concerning family size and employment status. As well, it asks numerous other questions which we use to control for demographic variation and individual heterogeneity in their preferences for family size. The respondents are not re-interviewed across years so that the data are repeated cross sections rather than a panel. A description of the variables we examine is presented in the Data Appendix.[9]

The key variable of interest for this study is a measure of a respondent's family size. We adopt a number of measures of this from the data available in the GSS: namely, the respondent's actual number of children, KIDS, and their actual plus expected additional children, TOTKIDS. The latter may be an important measure of family size for younger respondents who may be planning to add children to their current family size in order to reach their preferred family size.

Of course, the self-employment status of the family is also a key variable of interest in this study. We denote SELFE to be a dummy variable equal to 1 if the respondents report that they are self-employed, and zero otherwise.[10] As discussed above, self-employment is our proxy for a family business, as self-employment provides perhaps the greatest opportunity to pass down a business to a member of the next generation of one's own family. Hence, if our theory is correct, the motivation for succession and insuring the business's survival is likely to be key component in the fertility decisions of the self-employed. To control for additional family related factors influencing a respondent's family size, we allow for a number of variables

[9] There are a total number of 15 thousand respondents who were not retired or in school (nor were their spouses if they had one) and responded to family size and self-employment questions throughout most years in 1972-2002. For the sample of currently married male respondents who are not in school nor retired (nor are their spouses), summary statistics for the key variables are reported in the Table 1.

[10] The exact wording is: ' (Are/Were) you self-employed or (do/did) you work for someone else? '.

related to the respondent's family. For instance, MARRIED is a dummy variable that indicates whether the respondent is currently married. As well, SPOUSEH is a dummy variable that takes the value 1 if the work status of the respondents spouse was 'taking care of the house', and 0 otherwise.

Additional explanatory variables which we use to control for observable factors that can systematically influence an agent's preference for more children are the respondent's age, AGE, sex, MALE, and a measure of their perceived financial status relative to others, FINRELA.[11] We also constructed measures of work and life experience: GENERATION is the year that the respondent was born, and LMEX is the respondent's labor market experience, namely their age minus their number of years of schooling minus 6. We also use highest educational attainment for the respondent and the spouse as possible controls for the respondent's preference for children: DIPHR, DIPJCR, DIPBAR, DIPGDR, DIPHSP, DIPJCSP, DIPBASP, and DIPGDSP are dummy variables for whether the highest diploma (DIP) was for high school (H), junior college (JC), four year college (BA) or for graduate school (GD), earned by the respondent (R) and spouse (SP).[12] Additional demographic information is contained in the dummy variables JEWISH and CATHOLIC, for respondent listed religion, WHITE and BLACK, for whether a respondent lists this as their race. City size effects are also controlled for: CTYSZ1 is a dummy variable if the respondent's residence is less than 10,000, and 0 otherwise. CTYSZ2, CTYSZ3 and CTYSZ4 are similarly defined for population ranges 10,000 to 100,000, 100,000 to 1 million, and greater than 1 million, respectively.

[11]FINRELA is measured on a self reported scale of 1 to 5, with 1 being that your financial status is well below the mean, 2 being that it is below the mean, 3 being that it is about the mean, 4 being that it is above the mean, and 5 being that it is far above the mean. While the GSS does report family income for some years, it does not do so for all years.

[12]Unfortunately, not all demographic questions are asked for both the respondent and his/her spouse. As noted below, this leads us to only use Male respondents for the majority of our empirical work. Note that the main result, that self-employed respondents have more children, holds for the full sample, and a large fraction of the sub-samples, including Males and Females separately.

Finally, we also control for the respondent's reported INDUSTRY using a series of eleven dummy variables: Agriculture, Mining, Construction, Manufacturing, Transportation, Wholesale, Retail, Finance (FIRE), Entertainment, and Public Administration, and Professional Services. We also use the information on the respondent's family background that they were raised in: SIBS is their number of siblings, while IMGRNT, IMGRNTPA and IMGRNTMA are dummy variables that denote whether the respondent, the respondent's father and mother were immigrants, respectively. Moreover, ETHNIC ORIGIN denotes the country the respondent's ancestors came from: Africa, Austria, French Canada, Other Canada, China, Czech Republic, Denmark, England, Wales, Finland, France, Germany, Germany, Greece, Hungary, Ireland, Italy, Japan, Mexico, Dutch Holland, Norway, Philippians, Poland, Puerto Rico, Russia, Scotland, Spain, Sweden, Switzerland, West Indies, and Other.

4.3.2 Evidence

In the following sub-sections, we examine the main prediction from our theory: namely, that individuals who are self-employed are more likely to have larger families than those who are not self-employed. Sub-section 4.3.2 presents the stylized facts of the data we employ for this study. Sub-section 4.3.2 provides a more formal empirical test of our hypothesis.

Empirical Regularities

Table 1 provides an interesting set of empirical regularities in the data. For purposes described below, the primary data set we examine in this study includes only currently married males who are neither currently enrolled in school nor retired nor are their spouses.[13] The first column of the data lists variable names, while columns

[13]As we demonstrated below in Tables 2 and 4, the general finding that respondents who report that they are self-employed have significantly more children hold for both men and women. However, while the GSS reports the spouse's self employment status, it does not provide much of the important demographic information for the respondent's

two through four present the variable's mean, standard deviation and median. The final three columns of the table report the correlation coefficient between the variable in the first column and the three key variables of interest in this study: namely, KIDS, KIDSTOT, and SELFE, respectively. As reported in the table, the respondent's average number of actual and expected children is 2.2 and 2.4, respectively, while the average number of siblings is relatively larger at 3.8. The average respondent is just over 40 years old, has over 13 years of schooling and has approximately 23 years of labor market experience. The majority of the sample reports their race as WHITE, their religion as PROTESTANT and lives in a city size of under 100,000 (CTYSZ1 and CTSZ2 combined).[14]

The correlation coefficients reported in Table 1 also reveal a number of interesting findings between the variables of interest. First, as expected, the actual and expected number of children are highly correlated. Consequently, other variables have similar correlation patterns with these two variables. Second, age and labor market experience are positively and significantly correlated with the actual and expected number of children. Moreover, these correlations are large. Also of interest, the respondent's education is negatively correlated with the number of children, while his number of siblings and whether his wife works in the home is positively correlated with his number of children. Also, respondents that are BLACK, or from smaller cities, or that are CATHOLIC, tend to have more children.

Finally, approximately 18 percent of the respondents list themselves as 'self-employed'.[15] Interestingly, self-employment status and the number of children is pos-

spouse. Hence we believe that given data availability the male only sample provides a more comprehensive picture of the relationship between self-employment status and family size.

[14]Friedlander and Silver (1967) argue that less dense populations are likely to have lower living costs, and thus would be more likely to have higher fertility rates.

[15]Again, this is for married men who are not retired, nor in school, nor are their spouses. The mean self-employment rate for women is 8.8 percent for married women who satisfy this same criteria.

itively and significantly correlated. Also, self-employment status appears to be higher for older respondents with more labor market experience, as well as for those who report themselves as JEWISH. Finally, consistent with Fairlie and Meyer (1996,2000), self-employment is significantly higher for WHITE's and lower for BLACK's.[16] Moreover, as indicated by their significant negative correlations with GENERATION, both self-employment and the number of children have decreased over time. As such, this will be an important variable to control for in our regression results below in sub-Section 4.3.2.[17,18]

Table 2 presents the difference of means by self-employment status. The first column of the table lists the samples of interest, while column two provides the dependent variables, namely KIDS and KIDSTOT. Columns three through five report the average number of actual and expected kids for the full sample, the proportion of the sample that is self-employed, and for the proportion of the sample that is not self-employed, respectively. Column six presents the p-value of the test that the means are equal across the two sub-samples (i.e. self-employed and not self employed), while column seven displays the number of observations for the sample of interest.[19] The presentation of the means and the test of the equality of means across the sub-samples is performed for both measures of the respondent's number of children – KIDS and KIDSTOT.

A key and fundamental observation from the Table 2 bears directly on the model's

[16]Fairlie and Meyer (2000) test several hypotheses in order to explain the difference in black and white self-employment rates. These hypotheses center on whether demographic changes have led to a decrease in the black/white gap and whether the black/white gap is due primarily to the historically low self-employment rates and past inexperience of blacks. They find that demographic changes that occurred in the twentieth century did not have a large effect on the black/white self-employment gap and using a simple intergenerational model of self-employment they find that it is not only initial conditions that explain low black self-employment but also continuing forces that depress black self-employment (i.e. discrimination or skills, capital, and intangibles that are passed intergenerationally).

[17]To note, the regression results not only include GENERATION as a right hand side variable, but they also include dummy variables for the year in which the interview took place.

[18]The four largest industries represented among the self employed are (in order) Finance, Construction, Professional Services, and Agriculture, respectively. The latter, which accounts for about 14 percent of the self employed in our sample but are only 4 percent of sample, is excluded from our baseline empirical work in columns (VII) and ($VIII$) of Table 4. The results are unaffected by their exclusion.

[19]The underlying t-test is obtained using a procedure that is robust to heteroskedasticity of unknown form.

main prediction: that is, for the full sample and for 81 out of the 94 sub-samples, the average number of children, both as measured by KIDS and KIDSTOT, is larger for the self-employed sub-sample versus the non-self- employed sub-sample. In other words, in 81 out of 94 cases the means in column (V) are larger than those for column (VI). Moreover, 56 out of the 94 tests of the equality of the means that are reported in Table 2 are statistically significant at or below the .1 level, and in all these cases the mean number of children of the self-employed is greater than that of the non-self-employed. And often in these cases where the null hypothesis of no difference between the two means fails to be rejected are typically for sub-samples with a small relatively number of observations. For example, the sample of males living in large cities (CTYSZ3 and CTYSZ4) have sample sizes of 693 and 203 and fail to show any significant difference between the average number of children. There are, however, a number of instances where the p-value is below .1 despite the small sample size. For example, the sample size for Jewish men is only 84 but for both measures of the dependent variable, the difference in the means is significant at the .1 level. Interestingly, there does seem to be some regional variation in differences of the means. These regional variables will be in the regression results below and are often statistically significant.

Table 2 provides some other interesting findings. First, regardless of their marital status, men who are self-employed have, on average, a higher number of actual and expected kids as compared to men that are not self-employed – the difference in means is significant at below the .01 level. Second, regardless of immigration status and the immigration status of the respondents father, those who are self-employed have a statistically significant higher average number of kids. Similarly, regardless of the respondents spouses work status (SPOUSEH), and the familys relative income

(FINRELA), men who are self- employed on average tend to have a significantly larger number of actual and expected kids. Finally, there is also some heterogeneity of differences in the actual and expected number of children even within industry classifications. Interestingly, within each of the Retail, Financial and Professional Services industries, self-employed respondents have more actual and expected children. These findings are of interest, as many of these industries are likely to exemplify the type where a self-employed business could benefit from a child who sees the private value to the business (e.g. a retail shop, an insurance business, a dentist practice, etc...).[20] Taken together, we believe that the results in Table 2 provide extremely strong preliminary evidence in favor of the prediction: namely, *ceteris paribus*, self-employed respondents have more children.

Estimation

To test the hypothesis that the self-employed have more kids, we regress measures of family size (KIDS and KIDSTOT) on a dummy variable for whether the respondent is self-employed (SELFE) and a number of control variables to proxy for the respondents preferences for their family size.[21] The control variables can be thought of as capturing household characteristics and demographics. Examples of the former are whether or not the spouse stays at home (SPOUSEH) and the respondents perceived financial relative position (FINRELA). Examples of the latter are features of residential area (CTYSZ), the respondents age (AGE); and trends that may affect

[20] That Financial (Finance, Real Estate and Insurance) and Professional Services industries demonstrate this feature is particularly important for overcoming the following criticism: perhaps the cost of child rearing is cheaper for the self-employed as they have a source of cheap, unpaid help. While this criticism could apply to some retail stores (e.g. restaurants), it certainly would not apply to the more skilled professions inherent in Finance, Insurance and Real Estate or Professional Services.

[21] Again, as in Table 1, the regression results will be only for married working males, though the results in Table 2 demonstrate that this fact is broader than for just this sub-sample of the data. The focus on men is primarily due to the data incompleteness for the respondent's spouse. Since married women are more likely to be part-time employed as compared to men, their self-employment status is likely to be less important in the fertility decision. Unfortunately, since we only have the parent's self- employment status for the respondent but not for the respondent's spouse, we are missing crucial information for the instrumental variables estimation when we look at female respondents.

the number of children a couple has over time: year of birth. The model is specified as follows:

$$N_i = \beta_0 + \beta_1 \cdot SELFE_i + \beta_2 \cdot X_i + \beta_3 \cdot T_i + \epsilon_i \tag{4.5}$$

where N_i represents the number of kids respondent i has or expects to have, X_i represent household characteristics and demographics of respondent i, and T_i represent time dummy variables for the year in which the interview was conducted. More specifically, the following variables are used as controls: SPOUSEH, FINRELA, JEWISH, CATHOLIC, AGE, AGE^2, GENERATION, LMEX, SIBS, BLACK, WHITE, 8 variables separately denoting the respondent and spouses highest degree obtained (DIPHR, DIPJCR, DIPBAR, DIPGDR, DIPHSP, DIPJCSP, DIPBASP, and DIPGDSP), three dummy variables for whether the respondent, father or mother were immigrants to the U.S. (IMGRNT, IMGRNTPA and IMGRNTMA) 26 ethnic origin dummy variables, dummy variables for city size (CITYSZ1-4), and the 8 Census regions.[22] The data are described fully in the Data Appendix. Also, Table 1 and 2, as summarized previously, provide some raw data on the variables of interest and the control variables.

We estimate a number of empirical regressions of KIDS and KIDSTOT on the explanatory variables. To control for the possibility of endogeneity among some of the explanatory variables in particular, SELFE and SPOUSEH we also estimated the specifications using instrumental variables, IV.[23] While our theory predicts that the self-employed will tend to have more kids, we cannot ignore the possibility that families with more kids will see the benefits of a family business and choose to become

[22] The specifications also contains a constant, so that where appropriate a dummy variable is excluded so as to avoid collinearity.

[23] More specifically, the instrumental variables approach we adopt is the two-step efficient Generalized Method of Moments estimator.

self-employed. Also, since women who stay home instead of work in the market have more kids, a wife with more kids is more likely to stay at home – see the survey in Blau (1998). To control for the possibility that SELFE and SPOUSEH may be endogenous, we use a number of instruments, Z, that explain SELFE and SPOUSEH but are exogenous to KIDS and KIDSTOT. In particular, the instruments used are whether or not the respondents father was self-employed, the industry the respondent works in, stability of the respondents household at age 16, the religious affiliation of the respondent at age 16, and the financial relative status of the respondent at age 16.[24,25] As demonstrated in the p-values below, together these variables are statistically significant predictors of SELFE and SPOUSEH, and the instruments are not significantly correlated with the error term. As the number of instruments exceeds the number of estimated coefficients, below we will test the over-identifying restrictions that the residuals and the instruments are orthogonal – see the p-value of the J-test below.

Table 3 provides estimation results of the specified key variables for the OLS and

[24]For example, Hout and Rosen (2002) demonstrate that the offspring of self-employed fathers are more likely themselves to be self-employed, primarily for the reason we identify: namely, to hand down the business. Indeed, in our data, the probability of a respondent being self-employed given that his father was self-employed is equal to .279 (350/1255). In contrast, the probability falls to .141 (417/2965) if the respondent's father is not self-employed. The difference is statistically significant at below the .001 level. However, unlike Rees and Shah (1986), we do not have earnings differentials to explain self-employment, but rather use industry dummy variables as a proxy. Moreover, Blanchflower and Oswald (1998) find evidence that a respondent's receipt of a gift or inheritance increases the likelihood of self-employment. Their explanation, consistent with their theory, is that such a windfall reduces capital constraints on potential entrepreneurs. While such data is not available in the GSS, the likelihood of a gift or inheritance is likely to be correlated with one of our instruments: namely, the respondent's financial status at age 16.

Interestingly, the 'succession' motive for why self-employed parents have more children may be connected to this 'borrowing constraint' literature for the following reason: The within-family succession of a self-employed business is less likely to fail because of borrowing constraints as compared to the sale of the business to an individual outside the family. The reason is that families can use informal and non-market arrangements to compensate the parents for the business. Moreover, the existence of borrowing constraints would make it even less likely for a business owner to sell the business at a fair market price to an outsider, in addition to the information and monitoring reasons we have already discussed. Hence, the fact that potential buyers outside the family will be more likely to be borrowing constrained as compared to inside family members will magnify the desire of the self-employed to have more children in order to raise the chances of obtaining a good internal match for the business's succession.

[25]In general, the instruments are good predictors of the potentially endogeneous regressors. In Tables 3 and 4, the p-value for SELFE and SPOUSEH reports the significance level of the F-test that, in a first stage regression, the coefficients n the instrumental variables Z are not all jointly equal to zero when regressed against these variables. In all cases, the p-value for SELFE is below .001 (with an associated F-statistic of over 30, while the p-value for SPOUSEH ranges from .01 to .1, with an associated F-statistic of about 3. As the former is the basis of inquiry for this study, we believe that our list of instruments is a good one.

IV regressions for KIDS and KIDSTOT, the explanatory variables of interest are presented in column one and the results for the IV regressions are reported in the odd numbered columns. The table provides the coefficient estimates, their levels of significance, and their standard errors. At the bottom of Table 3 are reported p-values for several tests to be explained later.

The key result from Table 3 is that, after controlling for a whole host of demographic variables such as religion, age, labor market experience, race, immigration status and other variables assumed to influence the number of kids an individual may choose to have, the estimated coefficient on SELFE is positive and statistically significant at below the .10 level in all regressions. The coefficient estimates from the IV regressions show that a male who is self-employed has approximately 0.4 more kids than his non-self-employed counterpart, and expects to have about 0.5 more kids than a male of equal standing but who is non-self-employed. For the OLS regressions, the coefficient estimates on SELFE are not as large in magnitude, though they are still statistically significant in all four columns. These results indicate that a self employed male has .139 more kids and expects to have .161 more kids than a male who is not self-employed.

An important result that is in accordance with previous research on the optimal number of kids is that the coefficient on FINRELA is negative and significant at the .05 level. The negative relationship between income and fertility decisions found in previous studies is assumed to explain a households decision to spread risk across children – see Appelbaum and Katz (1991) as well as Mulligan (1997). Another important result studied by many researchers is the role the mothers involvement in the labor market has to do with a households decision to have kids. Previous research has found that there is a negative relationship between a wifes labor market participation and the number of kids she gives birth to – see Willis (1973), Robinson and Tomes (1982), and Rosenzweig and Schultz (1985).[26] Whether or not the spouse stays at home is positive and highly significant in both OLS regressions but loses its significance when instrumented for in the IV regressions – see footnote 31.

Some other interesting results observed in Table 3 are that the CATHOLIC variable is positive and significant at the .01 level in each one of the regressions. Individuals who are Catholic tend to have approximately .16 more kids and tend to expect approximately .23 more kids. The JEWISH variable is negative in all regressions, though it is not statistically significant. Older men tend to have more actual and expected children, while the coefficient on the GENERATION variable, which is used to capture the change in demographics and changes in family structure over time, is negative for each of the regressions but is only significant for 1 of the 4 regressions. LMEX which is used to measure the husbands stability in the workforce which in turn provides a measure of the stability of the household is positive in all four of the regressions but only significant in both the OLS and the IV regressions for KIDS, a male with an additional year of labor market experience appears to have approximately .04 more kids.

Individual characteristics, for the most part, are as expected. The more siblings you have the more likely you are to have and expect more kids. Blacks tend to have more kids, and immigration status and mothers immigration status has no significant effect on the number of kids you have, while fathers immigration status has a negative and significant effect on the number of kids you have and expect to have.[27]

[26]These authors argue that raising children is labor intensive which is why it accounts for the negative relationship with the mother's labor market participation, particularly in the short run.

[27]Previous research such as Borjas (1986), and Fairlie and Meyer (1996), has found that several immigrant groups have a statistically higher self-employment rate than the native born. While we do not show a statistical positive correlation between immigration status and self-employment it could be due to the low number of observations or the fact that we did not distinguish directly between different immigrant groups, though we do control for a respondents ethnic origin.

The p-values for the F-test of whether variables in sub-categories are all equal to zero are reported at the bottom of Table 3. The diploma variables, the regional variables and the ethnic origin variables all reject the null hypothesis that the coefficients are all zero for each of the regressions, implying that education, location, and ethnicity influence the number of kids you have and expect to have.[28] On the other hand, the null hypothesis for the year variables is rejected for expected number of kids but not for actual number of kids. The null hypothesis that all the coefficients on the city size variables are zero is rejected for the actual number of kids but failed to be rejected for the expected number of kids.

Also reported at the bottom of Table 3 is the p-value for the Hausman test, which tests whether there is any significant difference between the OLS regression and the IV regression for the estimated coefficients on SELFE and SPOUSEH. Under the null hypothesis that there is no endogeneity bias to self-employment status and whether the respondents spouse stays at home, the estimated coefficients on these two variables should be the same across the OLS and IV estimation methods, with the exception that the IV estimate would be less efficient. If, however, the estimates using OLS and IV are different, then this would indicate evidence against the null hypothesis of no endogeneity bias. The results using the actual number of kids as the dependent variable suggests that there is no significant difference between the IV and OLS estimates of these key variables, which suggests that we do not have any endogeneity problems. However, when the expected number of kids is the dependent variable, there is a significant difference between the OLS and the IV regression at the .10 level, which suggests that the IV regression will provide a more accurate estimate of the effect of self-employment status on family size. The final three rows of Table

[28] In particular, the city size and Census Region variables – New England, Mid- Atlantic, Central NE, Central NW, South Atlantic, Central SE, Central SW, and Pacific – proxy for the fact that environmental factors may explain differences in birth rates – see Shultz (1969).

3 provide further evidence that the IV regressions are meaningful. The row denoted J-test is the orthogonality test between the estimated residuals and the instruments. The p-value indicates that there is no evidence to suspect that the instruments are correlated with the error term. Finally, the p-values denoted SELFE and SPOUSEH are the p-value from an F-test of the null hypothesis that in a linear regression of each of these variables on the instruments, that all the coefficients on the instruments would be jointly equal to zero. As such, this type of test indicates whether the instruments are correlated with the potentially endogenous regressors. As the p-values indicate, however, the instruments are statistically significant predictors of SELFE and SPOUSEH.

While the results in Table 3 provide consistently strong findings in support of the theory's prediction, the results in Table 4 provide additional results to show the robustness of our findings. For example, in columns (I) through (X) of Table 4, we present both OLS and IV estimates of the coefficients for sub-samples where respondents report that KIDS is positive, the respondent's spouse stays at home ($SPOUSEH = 1$), the respondent is currently in his first marriage (MAR1=1), for respondents that are not in the agricultural industry (AG=0), and for respondents that are not immigrants nor are their parents (IMGRNT=0).[29] To keep the number of results to a minimum, the dependent variable in each of these specifications is KIDSTOT.[30]

Estimating the relationship between self-employment and family size over these sub-samples is helpful for a number of reasons. First, individuals may not have a

[29]Interestingly, Friedlander and Silver (1967) find that as a country's fraction of self-employed non-farm population rises, that their fertility rate rises. Though they do not provide an explanation for this finding other than to conjecture that there are lower child rearing costs for the self-employed, this fact is consistent both with our theory and empirical work on individual household behavior. See footnote 20 for our argument why this is not likely to be an explanation for our finding.

[30]To note, the results are similar when KIDS is used as the dependent variable.

particularly precise idea of their preferred family size (KIDSTOT) until they actually have some children ($KIDS > 0$). Note, however, that the results in columns (I) and (II) are very similar to those for the full sample. Second, since a prime determinant of whether a spouse stays at home is whether they have children (and or whether they have a larger number of children), the potential endogeneity of the variable $SPOUSEH$ may be worrisome. Indeed, as shown in Table 3, while the coefficient on SPOUSEH is statistically significant in the OLS regressions, it is not so in the IV ones.[31] Interestingly, as shown in columns (III) and (IV) of Table 4, the OLS estimate of the coefficient on SELFE is insignificantly different from zero, although the IV estimate is significantly different from zero at the .01 level. Moreover, the IV estimate on the coefficient on SELFE is quite large – i.e. it predicts that for respondents with stay at home spouses, self-employed have over 1.0 additional children than do the non-self-employed. Third, we report estimates for the sub-sample of male respondents who are currently married and have never been married before (MAR1).[32] This sub-sample is important since the relationship between respondents and children from prior marriages may cloud the empirical relationships that we are attempting to investigate. However, as demonstrated in columns (V) and (VI), the estimated specification is very close to that for the full sample – see Table 3 columns (III) and (IV). Furthermore, as emphasized by Fairlie and Meyer (1996, 2000), we re-explore our empirical findings by removing respondents who are in the agricultural industry. As shown in columns (VII) and (VIII) of Table 4, however, the empirical results are virtually identical when these respondents are removed from the sample.[33]

[31] Of course, this is hampered by the fact that number of children is often an instrument for whether a spouse stays at home. For example, see the survey in Blau (1998).

[32] The data is similar to that in Table 3 – that is, neither the respondent nor his spouse are retired or in school.

[33] While the level of statistical significance is no longer at below the .05 level, it is significant at the .06 level. Moreover, the estimated coefficient value is very similar to that in our baseline specification in Table 3, although the larger estimated standard error is consistent with the smaller sample size.

As a final attempt to demonstrate the robustness of our findings across sub-samples, columns (IX) and (X) report the model's estimates when respondents who are immigrants or whose parents are immigrants are removed from the sample. Such a control is of interest since respondents whose parents are immigrants are more likely to be self-employed: see Table 1. However, as shown in columns (IX) and (X), the results are unchanged from our baseline set of results when we remove respondents who are immigrants or whose parents were immigrants from the sample.[34]

Table 4 also allows for a few changes to the econometric approach to estimating our basic specification. In particular, since the number of children is bounded below by zero, one may wonder whether our estimates are impacted by directly incorporating this into our estimation procedure. To this end, column (XI) and (XI) report Tobit and Instrumental Variables Tobit estimates of the key parameters. As the results suggest, however, the using this more sophisticated approach provides estimates and levels of significance almost identical to that using OLS and IV as presented in Table 3. Finally, in column (XIII) of Table 4, we re-estimate our specification using an Ordered Probit model. Such an estimator would directly incorporate the fact that the number of children discrete. Once again, however, the estimated pattern of signs and statistical significance are similar to our baseline estimates in Table 3.

4.3.3 Remarks

Taken together, the results in Tables 3 and 4 confirm the broad evidence presented in Table 2: self-employed households tend to have more children. We have demonstrated this result to be robust over key sub-samples of the data as well as to alternative methods for estimating the parameters. As such, we believe we have demonstrated that there is strong evidence in favor of our theory which is predicated

[34]Though not shown, the results are also unchanged when the sample is just whites who were not immigrants nor were there parents.

on the idea that self-employed households increase their number of children in order to improve their chances of finding a match that improves the value of the business.

Nevertheless, doubts about the link between our theory and the evidence may persist. And perhaps reasonably so. For example, one may conjecture that non-pecuniary benefits of having children may be higher for the self-employed for at least two reasons. First, the possibility exists that individuals may choose to be self-employed because the self-employed spend less time at work, which then allows them to spend more time with their children. Unfortunately, while we cannot fully test this hypothesis with the GSS data, there is some evidence in the GSS data that suggests just the opposite: namely, that the self-employed work more hours than fewer hours. For example, the GSS asked the following question: "How many hours did you work last week ". Interestingly, the simple correlations between KIDS and KIDSTOT with HOURS are $-.013$ and $-.021$, respectively, neither of which is statistically different from zero. However, the correlation between SELFE and HOURS is .092, which is statistically different from zero at below the .0001 level.[35] Put in another light, the average hours of worked for the self-employed is over 49 hours per week, while that for the non self-employed is around 45. Hence, more time spent at work suggests that self-employment does not free up extra hours with which to spend with one's children, the latter which would generally be expected to be associated with respondents who prefer larger families. Finally, this mean gap of about 4 hours per week remains statistically significant even if we include all the control variables used in our control for all the explanatory variables in our estimating equation (4.5).[36]

However, while self-employed respondents may work about 10 percent more hours

[35] Again the sample is for MALE respondents, who are currently married, and neither they nor their spouses are retired or in school. Since fewer responded to the hours question, the number of observations is about 3800.

[36] In other words, when we replace N_i with $HOURS$ in regression (4.5), we find an effect equal to 3.8 hours with a robust t-statistic of 6.8. Moreover, this estimate and level of significance is unchanged even if we also include the instrument variables Z, which include industry dummy variables for the respondent.

than non self-employed respondents, perhaps there is a sense in which these jobs are more family friendly. Of course, while self-employment does provide some job flexibility (i.e. as your own boss you don't have to 'punch a clock'), the additional hours of work are likely to make other labor-leisure trade-offs more difficult to manage.[37] The GSS actually provides a number of questions, though only for a limited time period, about the extent to which work may impinge upon family obligations. For example, in 1996, the GSS asked respondents whether work had ever made them 'miss a family occasion or holiday,' 'been unable to care for a sick child or relative', or 'been unable to do the work you usually do around the house'. Also, in 1998 they asked how important were 'the person's family responsibilities?' Importantly, the responses to these questions were all insignificantly correlated with the respondent's self-employment status at or below the .1 level. Hence, self-employment (at least for the male sub-sample we have considered) is not a bargain with respect to increased flexibility towards family commitments. As such, this lessens the weight behind the criticism that households choose self employment in response to a larger actual or expected family size.[38]

4.4 Conclusion

Self-employed entities face unique challenges that separate them from other publicly-owned enterprises. Aside from the profit-maximizing objective, self-employed individuals are typically concerned with ensuring that the business stays within the family. Reconciling the two objectives, namely, the success of the business and the

[37] Hamilton (2000) reports that the self-employed tend to earn less and work more than individuals with similar employment situations.

[38] In a recent important contribution, Frey and Benz (2003) provide evidence from Germany, the U.K. and Switzerland that self-employed are happier with their work not due to better financial outcomes, but rather because of non-pecuniary benefits such as their work's independence and lower level of hierarchy. This work extends Blanchflower and Oswald's (1998) and Blanchflower's (2000) finding that the self-employed are happier than similarly employed workers.

control of the family over the business, implies that the parent must try to find a match among his children that would also guarantee the success of the business.

We provide a theory whereby self-employed households have an inducement to have more children in order to raise the expected return to their business. The important mechanism which generates this is that having more children can increase the likelihood that an inside family member will be a good match at running the business. Using data from the General Social Survey, we find empirical support for this finding. That is, overall, we demonstrate that there is a strong empirical relationship between a respondent's family size and self-employment status. We find that, *ceteris paribus*, the self-employed have between .2 to .4 more actual and total (that is, actual plus expected) children than do the non-self-employed. This finding holds across a broad array of sub-samples in simple tests of the differences in means. It also holds in empirical regressions when control variables are included, and when the self-employment status of the respondent and whether the respondent's spouse stays at home are all allowed to be endogenous.

Table 4.2: Tests for Differences in Means by Self-Employment Status

		MEANS				
Sample (I)	Variable (II)	FULL (III)	SELFE (IV)	NON-SELFE (V)	p-value (VI)	NOBS (VII)
ALL	*KIDS*	1.83	2.05	1.80	.000	15010
	KIDSTOT	2.09	2.24	2.07	.000	15010
ALL MALES	*KIDS*	1.70	2.00	1.64	.000	6859
	KIDSTOT	2.01	2.23	1.96	.000	6859
ALL FEMALES	*KIDS*	1.94	2.12	1.92	.003	8151
	KIDSTOT	2.16	2.25	2.15	.120	8151
MALES†						
& BMAR	*KIDS*	2.18	2.36	2.14	.000	5267
	KIDSTOT	2.36	2.50	2.33	.003	5267
& MAR1	*KIDS*	2.13	2.34	2.08	.000	3372
	KIDSTOT	2.34	2.49	2.31	.007	3372
& MAR	*KIDS*	2.22	2.45	2.16	.000	4220
	KIDSTOT	2.41	2.60	2.37	.000	4220
MALES† & MAR						
& IMGR	*KIDS*	2.14	2.56	2.07	.067	339
	KIDSTOT	2.38	2.79	2.31	.086	339
& IMGRPAR	*KIDS*	2.35	2.64	2.28	.020	782
	KIDSTOT	2.52	2.78	2.46	.036	782
& CATH	*KIDS*	2.36	2.58	2.32	.069	1161
	KIDSTOT	2.61	2.83	2.57	.053	1161
& JEWISH	*KIDS*	1.95	2.20	1.73	.082	84
	KIDSTOT	2.06	2.28	1.86	.104	84
& PROTESTANT	*KIDS*	2.23	2.46	2.18	.001	2471
	KIDSTOT	2.42	2.59	2.37	.009	2471
& BLACK	*KIDS*	2.66	3.07	2.62	.271	325
	KIDSTOT	2.84	3.41	2.79	.190	325
& WHITE	*KIDS*	2.17	2.40	2.12	.000	3735
	KIDSTOT	2.37	2.55	2.33	.001	3735
& RACEOTH	*KIDS*	2.33	3.15	2.17	.003	160
	KIDSTOT	2.51	3.15	2.38	.017	160
& SPWRKH	*KIDS*	2.58	2.82	2.52	.011	1440
	KIDSTOT	2.76	2.92	2.72	.090	1440
& NON-SPWKRH	*KIDS*	2.03	2.25	1.98	.000	2780
	KIDSTOT	2.23	2.43	2.19	.001	2780
& CTYSZ1	*KIDS*	2.29	2.43	2.25	.082	1491
	KIDSTOT	2.48	2.59	2.45	.179	1491
& CTYSZ2	*KIDS*	2.19	2.54	2.13	.000	1833
	KIDSTOT	2.39	2.67	2.33	.001	1833
& CTYSZ3	*KIDS*	2.14	2.29	2.11	.232	693
	KIDSTOT	2.34	2.41	2.33	.549	693
& CTYSZ4	*KIDS*	2.15	2.36	2.10	.366	203
	KIDSTOT	2.39	2.69	2.32	.177	203
& RELINC12	*KIDS*	2.42	2.74	2.34	.009	825
	KIDSTOT	2.64	2.85	2.60	.102	825
& RELINC3	*KIDS*	2.20	2.45	2.15	.003	2082
	KIDSTOT	2.41	2.64	2.36	.005	2082

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Table 4.2 – continued from previous page

Sample (I)	Variable (II)	MEANS FULL (III)	SELFE (IV)	NON-SELFE (V)	p-value (VI)	NOBS (VII)
MALES† & MAR						
& RELINC45	*KIDS*	2.12	2.28	2.07	.041	1313
	KIDSTOT	2.27	2.42	2.24	.068	1313
& NEW ENGLAND	*KIDS*	2.10	2.65	2.00	.021	252
	KIDSTOT	2.30	2.89	2.20	.004	252
& MID-ATLANTIC	*KIDS*	2.10	2.24	2.07	.295	667
	KIDSTOT	2.28	2.41	2.25	.308	667
& CENTRAL NE	*KIDS*	2.29	2.54	2.24	.052	912
	KIDSTOT	2.50	2.67	2.47	.185	912
& CENTRAL NW	*KIDS*	2.37	2.78	2.24	.011	388
	KIDSTOT	2.53	2.93	2.41	.010	388
& SOUTH ATL.	*KIDS*	2.05	2.48	1.96	.005	581
	KIDSTOT	2.26	2.55	2.20	.064	581
& CENTRAL SE	*KIDS*	2.22	2.18	2.22	.873	245
	KIDSTOT	2.32	2.27	2.34	.782	245
& CENTRAL SW	*KIDS*	2.34	2.47	2.31	.412	346
	KIDSTOT	2.56	2.56	2.56	.975	346
& PACIFIC	*KIDS*	2.12	2.08	2.13	.789	356
	KIDSTOT	2.31	2.29	2.32	.862	356
& NO DIPLOMA	*KIDS*	3.03	3.27	2.97	.153	634
	KIDSTOT	3.15	3.38	3.09	.182	634
& HIGH SCHOOL	*KIDS*	2.17	2.33	2.14	.026	2175
	KIDSTOT	2.37	2.46	2.35	.201	2175
& JUNIOR COLLEGE	*KIDS*	1.93	2.05	1.92	.694	227
	KIDSTOT	2.26	2.57	2.23	.223	227
& BA	*KIDS*	1.86	2.12	1.79	.018	749
	KIDSTOT	2.07	2.34	2.00	.010	749
& GRAD	*KIDS*	2.03	2.50	1.88	.000	435
	KIDSTOT	2.20	2.59	2.07	.001	435
& AGRICULTURAL	*KIDS*	2.77	2.85	2.62	0.455	166
	KIDSTOT	2.96	2.96	2.95	0.966	166
& MINING	*KIDS*	2.43	2.29	2.44	0.878	61
	KIDSTOT	2.61	2.29	2.65	0.725	61
& CONSTRUCTION	*KIDS*	2.39	2.54	2.32	0.217	452
	KIDSTOT	2.59	2.73	2.52	0.261	452
& TRANSPORTATION	*KIDS*	2.23	1.96	2.25	0.190	396
	KIDSTOT	2.41	2.07	2.43	0.135	396
& WHOLESALE	*KIDS*	2.21	2.21	2.21	0.999	205
	KIDSTOT	2.40	2.38	2.41	0.896	205
& RETAIL	*KIDS*	2.10	2.39	2.00	0.040	353
	KIDSTOT	2.33	2.44	2.29	0.419	353
& FINANCE	*KIDS*	2.18	2.37	2.08	0.054	552
	KIDSTOT	2.39	2.54	2.32	0.142	552
& PUBLIC ADMIN.	*KIDS*	2.11	2.67	2.10	0.319	375
	KIDSTOT	2.28	3.00	2.27	0.033	375
& MANUFACTURING	*KIDS*	2.26	2.38	2.25	0.493	1132
	KIDSTOT	2.45	2.68	2.43	0.183	1132
& ENTERTAINMENT	*KIDS*	1.78	1.57	1.84	0.645	32

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Table 4.2 – continued from previous page

		MEANS				
Sample (I)	Variable (II)	FULL (III)	SELFE (IV)	NON-SELFE (V)	p-value (VI)	NOBS (VII)
MALES† & MAR						
	KIDSTOT	2.03	1.71	2.12	0.504	32
& PROFESSIONAL	*KIDS*	2.07	2.42	1.98	0.004	572
	KIDSTOT	2.26	2.53	2.20	0.024	572

Note: See Table 1 and Data Section 4.3.1. Column 1 reports the sample. Column 2 lists the measures of the number of Children. Columns 3 − 5 report the mean number of Children for the full sub-sample and then partitioned for the self-employed and non-self-employed portions of these sub-samples. Column 6 reports the p-value from the test (robust to heteroskedasticity of unknown form) of the null hypothesis that the means from the two partitioned sub-samples are identical. NOBS reports the number of observations. MALES† are MALE respondents who are neither retired nor in school, nor are their spouses.

Table 4.1: Sample Statistics

				CORRELATIONS		
VARIABLE	MEAN	STD	MEDIAN	KIDS	KIDSTOT	SELFE
KIDACT	2.215	1.593	2			
KIDSTOT	2.411	1.546	2	.922***		
SELFE	.182	.386	0	.069***	.058***	
FINRELA	3.113	.827	3	−.064***	−.079***	.027*
LMEX	23.2	12.8	21	.421***	.294***	.132***
AGE	42.6	12.1	41	.392***	.261***	.150***
GENERATION	1944.9	13.5	1947	−.390***	−.302***	−.134***
SPWRKH	.341	.474	0	.164***	.162***	.002
SIBS	3.812	3.194	3	.170***	.186***	−.034**
DIPHR	.850	.357	1	−.214***	−.200***	−.003
DIPJCR	.054	.226	0	−.043***	−.023	−.055***
DIPBAR	.177	.382	0	−.103***	−.103***	.029*
DIPGDR	.103	.304	0	−.040***	−.047***	.052***
DIPHSP	.590	.492	1	.010	.008	.000
DIPJCSP	.061	.240	0	−.037***	−.036**	−.005
DIPBASP	.157	.364	0	−.101***	−.083***	.031**
DIPGDSP	.057	.231	0	−.076***	−.084***	.007
BLACK	.077	.267	0	.081***	.080***	−.074***
WHITE	.885	.319	1	−.076***	−.074***	.068***
JEWISH	.020	.140	0	−.024	−.032**	.109***
CATHOLIC	.275	.447	0	.056***	.078***	−.052***
PROTESTANT	.586	.493	1	.014	.003	.020
IMGRNTR	.080	.272	0	−.013	−.005	−.022
IMGRNTPA	.160	.367	0	.035**	.027*	.019
IMGRNTMA	.144	.351	0	.028*	.026*	.019
CTYSZ1	.353	.478	0	.032**	.031**	.068***
CTYSZ2	.434	.496	0	−.011	−.014	−.050***
CTYSZ3	.164	.371	0	−.021	−.020	−.025
CTYSZ4	.048	.214	0	−.010	−.003	.006

Note: The data sample size is 4220 and includes only currently married male respondents when neither spouse is retired or in school, MALES† & MAR. See Data Section 4.3.1 and the Data Appendix for data descriptions. Column 1 lists the variables. Columns 2 through 4 report the means, standard deviations and medians. Columns $5-7$ report the correlations between the variables listed in the rows with those listed at the top of the columns. ***, **, and * indicate that the relationship is different from zero at or below the .01, .05 and .10 level of statistical significance, respectively.

Table 4.3: Baseline Regression of Number of Children on Self-Employment Status

Dep. Variable	KIDS		KIDSTOT	
Estimator	OLS	IV	OLS	IV
SELFE	.139***	.407**	.161***	.486***
	(.059)	(.183)	(.061)	(.185)
SPWRKH	.420***	.553	.353***	.030
	(.049)	(.627)	(.050)	(.643)
FINRELA	−.066**	−.062**	−.074**	−.079**
	(.029)	(.030)	(.029)	(.031)
JEWISH	−.084	−.170	−.097	−.188
	(.175)	(.179)	(.177)	(.180)
CATHOLIC	.159***	.170***	.229***	.252***
	(.058)	(.059)	(.059)	(.060)
AGE	.162***	.162***	.075***	.057*
	(.023)	(.034)	(.024)	(.035)
$AGE^2/100$	−.184***	−.189***	−.091***	−.082***
	(.013)	(.022)	(.014)	(.022)
GENERATION	−.015*	−.014	−.013	−.018
	(.008)	(.012)	(.008)	(.012)
LMEX	.039**	.043**	.026	.030
	(.019)	(.019)	(.020)	(.019)
SIBS	.040***	.040***	.049***	.048***
	(.009)	(.009)	(.011)	(.011)
BLACK	.765***	.748**	.708**	.717**
	(.298)	(.298)	(.294)	(.290)
WHITE	−.042	−.056	−.012	−.007
	(.169)	(.168)	(.163)	(.160)
IMGRNTR	.082	.074	.164	.175
	(.139)	(.138)	(.140)	(.137)
IMGRNTPA	−.198**	−.218**	−.230**	−.224**
	(.100)	(.106)	(.100)	(.107)
IMGRNTMA	−.073	−.057	−.085	−.083
	(.109)	(.109)	(.111)	(.110)
p-values				
YEARS	.623	.594	.000	.000
City Size	.021	.026	.169	.191
Diplomas	.000	.039	.002	.022
Region	.000	.000	.000	.000
Ethnic Origin	.010	.007	.002	.013
Hausman		.262		.062
J-test		.628		.568
SELFE		.001		.001
SPOUSEH		.046		.046

Notes: See Tables 1 and 2. Estimated standard errors, robust to heteroskedasticity of unknown form, in parentheses. IV refers to two-step efficient GMM. The data sample is for MALES† & MAR, with 4220 observations in each regression. P-values for YEARS, City Size, Diplomas, Region and Ethnic Origin are from F-tests from excluding the linearly independent time dummies, CITYSZ1-3, the eight respondent and spouse diploma variables, seven Census regions and 34 Ethnic origin dummy variables, respectively. Hausman is the p-value for the specification test that the coefficients on SELFE and SPWRKH are the same across the OLS and IV estimates. J-test is the p-value for the Hansen test that the residuals are uncorrelated with the instruments, Z. SELFE and SPOUSEH are p-values for the test that, in a first stage regression, the coefficients on the instrumental variables Z are not all jointly equal to zero when regressed against these variables.

Table 4.4: Additional Regression on Total Number of Children (KIDSTOT)

SAMPLE	$KIDS > 0$		$SPOUSEH = 1$		$MAR1 = 1$	
ESTIMATOR	OLS	IV	OLS	IV	OLS	IV
	(I)	(II)	(III)	(IV)	(V)	(VI)
SELFE	.176***	.605***	.161	1.034***	.103*	.576***
	(.059)	(.182)	(.113)	(.372)	(.061)	(.197)
SPWRKH	.270***	−.075			.366***	.773
	(.048)	(.608)			(.053)	(.545)
FINRELA	−.084***	−.091***	−.083	−.098	−.050	−.050
	(.028)	(.029)	(.054)	(.062)	(.031)	(.032)
JEWISH	−.186	−.309*	.013	−.172	−.027	−.186
	(.164)	(.167)	(.285)	(.272)	(.174)	(.182)
CATHOLIC	.189***	.215***	.285***	.327***	.258***	.250***
	(.057)	(.058)	(.107)	(.120)	(.061)	(.063)
AGE	.056***	.047	.096**	.085*	.054**	.064**
	(.023)	(.035)	(.045)	(.045)	(.026)	(.033)
$AGE^2/100$	−.074***	−.064***	−.123***	−.122***	−.076***	−.088***
	(.013)	(.023)	(.021)	(.021)	(.014)	(.022)
GENERATION	−.018**	−.022**	−.008	−.013	−.010**	−.005
	(.008)	(.011)	(.016)	(.016)	(.009)	(.011)
LMEX	.020	.013	.035	.035	.036*	.039*
	(.019)	(.020)	(.037)	(.037)	(.021)	(.021)
SIBS	.048***	.055***	.065***	.065***	.052***	.051***
	(.011)	(.012)	(.019)	(.019)	(.012)	(.012)
BLACK	.572**	2.629**	.824*	.978**	.995**	1.007***
	(.292)	(1.138)	(.456)	(.496)	(.307)	(.311)
WHITE	−.085	−.173	.133	.213	.097	.124
	(.160)	(.173)	(.295)	(.328)	(.153)	(.154)
IMGRNTR	.052	.068	.110	.112	.088	.094
	(.131)	(.128)	(.260)	(.250)	(.153)	(.158)
IMGRNTPA	−.154	−.147	−.214	−.208	−.234**	−.253**
	(.097)	(.105)	(.159)	(.154)	(.104)	(.110)
IMGRNTMA	−.024	−.005	−.193	−.207	−.060	−.065
	(.105)	(.106)	(.190)	(.183)	(.120)	(.123)
NOBS	3780	3780	1436	1436	3360	3360
p-values						
YEARS	.000	.000	.121	.126	.000	.000
City Size	.601	.178	.209	.425	.397	.575
Diplomas	.001	.009	.080	.047	.005	.179
Region	.000	.000	.008	.008	.000	.000
Ethnic Origin	.000	.129	.000	.030	.001	.001
Hausman		.015		.014		.037
J-test		.562		.270		.845
SELFE		.126		.000		.000
SPOUSEH		.100				.014

Note: See following page.

Table 4.5: Additional Regression on Total Number of Children (KIDSTOT): CONTINUED

SAMPLE	*AG* = 0		*IMGRNT* = 0		*ALL*	*ALL*	*ALL*
ESTIMATOR	*OLS*	*IV*	*OLS*	*IV*	*TOBIT*	*IVTOBIT*	*OPRBT*
	(*VII*)	(*VIII*)	(*IX*)	(*X*)	(*XI*)	(*XII*)	(*XIII*)
SLFEMPR	.144***	.494*	.116*	.645***	.155**	.499***	.120***
	(.065)	(.263)	(.066)	(.195)	(.063)	(.190)	(.045)
SPWRKH	.343***	.087	.408***	.280	.400***	.131	.272***
	(.051)	(.717)	(.057)	(.713)	(.052)	(.683)	(.037)
FINRELA	−.084***	−.090***	−.075**	−.076**	−.077***	−.082**	−.048**
	(.030)	(.031)	(.032)	(.033)	(.031)	(.033)	(.022)
JEWISH	−.112	−.211	−.088	−.207	−.068	−.162	−.090
	(.179)	(.190)	(.229)	(.236)	(.210)	(.217)	(.144)
CATHOLIC	.221***	.243***	.269***	.285***	.250***	.263***	.182***
	(.060)	(.062)	(.065)	(.065)	(.063)	(.065)	(.044)
AGE	.082***	.066*	.069**	.054	.091***	.078**	.066***
	(.024)	(.036)	(.027)	(.039)	(.024)	(.037)	(.017)
AGESQ/100	−.095***	−.088***	−.094***	−.091***	−.106***	−.100***	−.072***
	(.014)	(.024)	(.015)	(.024)	(.014)	(.024)	(.010)
GENERATION	−.014	−.019	−.012	−.013	−.013	−.016	−.010
	(.008)	(.013)	(.009)	(.013)	(.010)	(.014)	(.006)
LMEX	.021	.026	.035	.046**	.027	.031	.013
	(.020)	(.020)	(.023)	(.023)	(.018)	(.019)	(.013)
SIBS	.048***	.047***	.053***	.053***	.051***	.052***	.033***
	(.011)	(.011)	(.012)	(.013)	(.008)	(.008)	(.006)
RACEBL	.742**	.750**	.816**	1.290	.786***	.831***	.445**
	(.301)	(.298)	(.400)	(1.469)	(.273)	(.276)	(.196)
RACEWH	.014	.015	.247	.736	.007	.038	.029
	(.166)	(.162)	(.274)	(.634)	(.173)	(.175)	(.116)
IMGRNTR	.144	.153			.204	.225	.145
	(.143)	(.141)			(.167)	(.169)	(.103)
IMGRNTPA	−.191*	−.187*			−.272***	−.251***	−.173***
	(.101)	(.110)			(.104)	(.112)	(.074)
IMGRNTMA	−.111	−.103			−.095	−.117	−.073
	(.110)	(.111)			(.112)	(.114)	(.080)
NOBS	4036	4036	3407	3407	4220	4220	4220
p-values							
YEARS	.000	.000	.000	.000	.000	.000	.000
City Size	.228	.236	.462	.439	.111	.117	.235
Diplomas	.002	.028	.017	.183	.004	.024	.008
Region	.000	.000	.000	.000	.000	.000	.000
Ethnic Origin	.001	.008	.001	.168	.007	.009	.000
Hausman		.141		.005		.078	
J-test		.236		.645		.820	
SELFE		.000		.000		.001	
SPOUSEH		.038		.098		.046	

Note: See Tables 1, 2 and 3. In columns denoted OLS, IV, TOBIT, IVTOBIT and OPRBT, the coefficients were estimated using ordinary least squares, instrumental variables, tobit, instrumental variables tobit, and ordered probit, respectively. As in Tables 1 and 3, the data set only includes only married males who are not retired, nor are their spouses (MALES† & MAR). In columns (I) and (II), the data set removes respondents who have no current children. In columns (III) and (IV), the data set includes only those respondents whose spouses stay at home. In columns (V) and (VI), the data set includes only those respondents who have been married once. In columns (VII) and (VIII), the data set removes respondents in the agricultural industry. In columns (IX) and (X), the data set removes respondents who are immigrants or if either of their parents were immigrants.

Variables Used in the Analysis

Table 4.6: Data Appendix

Key Variables of Interest

KIDS The number of children respondent has ever had (includes those born from a previous marriage).

KIDSTOT The number of children respondent has plus the additional number they expect to have.

SELFE Dummy variable 1 if self-employed 0 if works for someone else.

Additional Control Variables

AGE Age of Respondent.

BLACK Dummy variable 1 if race is black, and 0 otherwise.

BMAR Dummy variable 1 if respondent has ever been married, and 0 otherwise.

CATHOLIC Dummy variable 1 if religion preference is Catholic, and 0 otherwise.

CTYSZ1 Dummy variable 1 if population at which interview took place is less than 10,000, and 0 otherwise.

CTYSZ2 Dummy variable 1 if population at which interview took place is greater than or equal to 10,000 but less than 100,000, and 0 otherwise.

CTYSZ3 Dummy variable 1 if population at which interview took place is greater than or equal to 100,000 but less than 1 million, and 0 otherwise.

CTYSZ4 Dummy variable 1 if population at which interview took place is greater than or equal to 1 million but less than 9 million 0 otherwise.

DIPHR(S) Dummy variable 1 if respondent's (spouse) highest degree received was from a high-school or GED certificate, and 0 if not.

DIPJCR(S) Dummy variable 1 if respondent's (spouse) highest degree received was from a junior college, and 0 if not.

DIPBAR(S) Dummy variable 1 if respondent's (spouse) highest degree received was from a 4 year college, and 0 if not.

DIPHGDR(S) Dummy variable 1 if respondent's (spouse) highest degree received was from a Graduate School, and 0 if not.

Ethnic Origin The Country the respondent's ancestors came from: Africa, Austria, French Canada, Other Canada, China, Czech Republic, Denmark, England, Wales, Finland, France, Germany, Germany, Greece, Hungary, Ireland, Italy, Japan, Mexico, Dutch Holland, Norway, Philippians, Poland, Puerto Rico, Russia, Scotland, Spain, Sweden, Switzerland, West Indies, Other.

FINRELA The respodent's household financial income relative to others. It is measured on a self reported scale of 1 to 5, with 1 being that your financial status is well below the mean, and 5 being that it is far above the mean.

IMGRNT Dummy variable 1 if respondent was not born in the U.S., and 0 otherwise.

IMGRNTMA Dummy variable 1 if respondents mother was not born in the U.S., and 0 otherwise.

IMGRNTPA Dummy variable 1 if respondents father was not born in the U.S., and 0 otherwise.

Industry Agriculture, Mining, Construction, Manufacturing, Transportation, Wholesale, Retail, Finance (Finance, Insurance and Real Estate), Entertainment, PROFESSIONAL (Professional Services), Administration.

JEWISH Dummy variable 1 if religion preference is Jewish , and 0 otherwise.

LMEX Respondent's labor market experience. Equal to Age minus years of school minus 6.

MALES Dummy variable 1 if male, and 0 if female.

MALES† Dummy variable 1 if MALES and if neither respondent nor spouse are in school or retired, and 0 otherwise.

MAR Dummy variable 1 if currently married, and 0 otherwise.

MAR1 Dummy variable 1 if respondent is currently married or widowed and never been previously married, and 0 otherwise.

PROTESTANT Dummy variable 1 if religion preference is Protestant, and 0 otherwise.

SIBS Number of siblings respondent has (includes those no longer alive, stepbrothers, stepsisters and children adopted by parents).

YRSCHR Number of years of schooling.

WHITE Dummy variable 1 if race is white, and 0 otherwise.

Regions New England, Mid-Atlantic, Central NE (North East), Central SE (South East), South Atlantic, Central SE, Central SW, and Pacific.

SPWRKH Dummy variable 1 if respondents spouse work status a week prior to the interview is either taking care of the house or student, and 0 if spwrk = 1.

4.5 Appendix

In period one, individuals choose the number of children they would like to have, n, as well as the amount of net-savings they would like to have to support themselves during their retirement in period 2. For simplicity, the interest rate on net-savings, NS, is assumed to be zero, and let α be the per-child cost of having children. Hence their period 1 consumption is equal to lifetime labor income less net-savings plus child costs and their period 2 consumption is equal to savings. Such individuals who work for a firm, therefore, maximize:

$$\max_{\{n,NS\}} W^F = \theta \cdot n + U(\overline{V} - NS - \alpha \cdot n) + U(NS) \tag{4.6}$$

where θ represents a household's exogenous and random preference for children.

The two optimality conditions are straightforward:

$$U'(c_1^F) = U'(c_2^F) \tag{4.7}$$

$$\theta = \alpha \cdot U'(c_1^F) \tag{4.8}$$

Equation (4.7) indicates that the individual maximizes consumption by equating his/her marginal utility across time, whereas equation (4.8) demonstrates that the number of children is chosen to equate the marginal benefit of a child to its marginal cost. Equations (4.7) (4.8) solve for the optimal number of children and level of net-savings for those who work for firms, namely n^F and NS^F.

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CHAPTER V

Conclusion

This dissertation presented three chapters on labor and development economics. The first two chapters investigated the role of food aid in rural Ethiopia. Findings showed that agency problems may be an important problem in targeting aid to intended beneficiaries and that agents are more likely to distort the distribution of aid receipts than the set of aid recipients. Our study also suggests that informal structures of power within African villages can influence the extent to which food aid insulates some of the world's poorest families from agricultural shocks. Conditional on receiving aid, results also show that aid has significant health effects on the poor. In fact, adults that were the most malnourished benefited the most from receiving aid. The final chapter examined the fertility decisions of self-employed men in the United States. Using data from the General Social Survey, we find that respondents have approximately .2 to .4 more actual and expected number of children if they are self-employed as compared to if they are not self-employed.