Risk, Network Quality, and Family Structure: Child Fostering Decisions in Burkina Faso

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COMMENTS WELCOME

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Abstract

Child fostering, the practice of sending your own biological child to live with another family or receiving a child from the child's biological parents, is prevalent throughout West Africa. Given the potential welfare implications from this practice, the paper seeks to explain why families adjust the structure of their households by fostering children. The paper develops and then empirically confirms a theoretical model that hypothesizes that households send out children for three distinct reasons. First, households send out children as a risk-coping mechanism in response to negative transitory, exogenous shocks. Second, to fulfill diverse labor needs within the household, parents attempt to offset demographic imbalances in the age and sex composition of their children through fostering. Third, in order to send a child, a potential sending household must have another household that wants to receive the child. The paper quantitatively measures the quality of the sending household's network of potential receiving households and finds that this network quality measure influences the probability that a household sends a child. The research is based on eighteen months of fieldwork in Burkina Faso conducted by the author. The survey instrument, written by the author, and the research methodology that involved locating both the sending and receiving households involved in each fostering exchange make these data particularly appropriate for testing this theoretical model.

1 Introduction

During the past three years, approximately twenty-seven percent of households in rural Burkina Faso have either sent one of their own biological children to live with another family or have received a child from the child's biological parents (data source, author's household survey). It is perceived wisdom among international development organizations that this child fostering is detrimental to the children, and therefore will further impair Africa's economic growth and limit its ability to achieve sustainable development. This paper seeks to explain why families adjust the structure of their households by fostering children. I develop and then empirically test a theoretical model that examines which factors about the sending and receiving household affect the sending decision. The empirical analysis is based on data from a unique household survey collected by a research team that I supervised during eighteen months of fieldwork in Burkina Faso. The survey instrument that I wrote and the research methodology that involved locating both the sending and receiving households involved in each fostering exchange make these data particularly appropriate for testing this theoretical model.

I hypothesize and then test that households foster children for three main reasons. The empirical results are consistent with the theoretical model. First, I argue that households use child fostering as a risk coping mechanism in response to exogenous income shocks. Households that experience negative shocks are more likely to send out a child. Second, I argue that to fulfill diverse labor needs within the household, parents want to offset demographic imbalances in the number of their children in a given age and sex class. Having too many children in the same sex and age class may not facilitate household production; therefore, households that are in that situation are more likely to send out one of those children.

The third reason relates to the fact that fostering a child must involve a sending household and a receiving household and each must find it advantageous in order for the exchange to occur. In this sense, the risk coping and household demographic explanations can only constitute part of the reason for fostering. There are instances when the household has a negative shock and wants to send a child but cannot identify a receiver household. Likewise, a potential sender household might want to send a child because of demographic reasons but cannot find a receiver household that wants to receive a child of that age and sex. In the theoretical model, information about the receiving households, in particular the receiver's demographic structure and the risks they face, is crucial to understanding the sending decision. The sending household is more likely to send a child if, in their immediate family network, there are potential receiving households that have an age and sex composition of children different from their own. Similarly, in the case where sending households' shocks are not correlated with the shocks of potential receivers in its network, the sending household is more likely to find a receiver if necessary. For example, if the sending household experienced a negative shock, it is more likely to find a potential receiver that experienced a positive shock to receive its child. In the empirical section,

I attempt to collapse this multi-dimensional information about the receiving households into a single variable that measures how good the sending household's potential receiving network is. The sending household's network quality positively influences their decision to send a child in a given year.

Given that child fostering has strong policy and welfare implications, understanding the parents' motivations for sending their children to live with other families is important. Since children comprise the majority of the population in many African countries and represent the future of the region, the quality of their health and education is an important determinant of Africa's future success or failure. If children lack the skills and knowledge needed to lead productive lives, Africa's future economic growth might be limited and their ability to grow out of poverty jeopardized (Boozer, Ranis, and Stewart, 2003).

Some researchers have argued that children who live away from their biological parents will be at a disadvantage. Case, Lin, and McLanahan (2000) argue that household expenditures on child-related goods are lower when the child does not live with his biological mother. Case, Paxson, and Ableidinger (2002) argue that children not living with their biological parents fare worse in terms of educational outcomes than children that do live with their biological parents. Bishai and Suliman (2002) argue that child mortality is linked to the biological relatedness of the child to the care providers. A study by Bledsoe and Brandon (1989) of foster and non-fostered patients in a hospital in Sierra Leone suggested that foster children are sicker and at higher risk of mortality than those children who reside with their biological mother. [1]

However, not all research on child fostering has come to the same conclusions regarding the welfare of the foster children. In a study in rural Mali, Castle (1995) found that nutritional health outcomes do not vary between children living with their biological parents and foster children. She also found that children who were requested by the receiving family had better nutritional outcomes than children sent due to crisis fostering, thus providing evidence that welfare outcomes for foster children are not homogenous. Lloyd and Blanc (1996) show that children's school outcomes in sub-Saharan Africa (measured by current school enrollment and grade four completion) are more influenced by characteristics of the child's extended family network and the household in which the child resides than by characteristics of his biological parents. Isiugo-Abanihe (1985) and Page (1989) argue that children may be sent to households to gain access to schooling that is not available in the child's natal village.[2]

[1] Additional evidence from Zimbabwe suggests that children who live away from their biological parents and provide domestic labor for the host family work between ten and fifteen hours per day, every day of the week (International Labor Organization, 1996), while a study from Tanzania shows these children working sixteen to eighteen hours per day (Smout, 1997). Kielland (1999a, 1999b) claims that children working this hard are more likely to miss formative educational and childhood experiences that can hinder their mental, emotional, moral, and physical development. Additionally, a report from Benin showed that children raised by adults other than their parents are more prone to abuse and exploitative work conditions (U.S. Department of State, 1998).

[2] Qualitative research that I conducted prior to the household survey data collection indicates that, in many cases, foster children are better off in terms of schooling outcomes or

Whether foster children are worse off or better off has not been conclusively proven, but it is certainly the case that many children are living away from their biological parents. The high prevalence of child fostering and the sheer numbers of children living away from their parents, both in Burkina Faso and in other countries in Africa, provide another justification for studying why households send out their children. A rough calculation using the Burkina Faso Demographic and Health Survey data shows that in 1993, approximately 500,000 children aged zero to fourteen were living away from their parents. In the rural areas, 14.0 percent of children aged five to fourteen were fostered (Dabire, 1998). A 2002 World Bank survey in Burkina Faso of 4500 randomly sampled rural households show that 9.5 percent of children age six to seventeen years old were living away from their parents (Kielland and Sanogo, 2002). Household survey data that I collected in Burkina Faso during 2001 indicate that, during the previous three years, 9.6 percent of children (aged five to fifteen inclusive) have been sent to live away from their biological parents. These same data used to analyze household level fostering during the previous three years show that 27.1 percent of all households have either sent (16.0 percent) or received (13.7 percent) a child with 2.6 percent of households both sending and receiving.

The seminal work in economics on child fostering is by Ainsworth (1990, 1996). She examines the economic determinants of child fostering decisions using data from the 1985 Côte d'Ivoire Living Standards Survey. One of the two possible explanations that she is able to examine with these data is that households might decide to receive children to satisfy a demand for child labor in home production. Foster children perform chores that might include cooking, cleaning, washing laundry, childcare, fetching wood, and running errands. Her empirical findings present evidence supporting the influence of the demand for child labor in the fostering decision. Anthropologists, demographers, and sociologists working in West Africa have also found evidence that receiving households accept foster children for child labor reasons (Andvig, Canagarajah, Kielland, 1999; Antoine and Guillaume, 1986; Ayeboa and Tingbe-Azalou, 1997; Bledsoe and Isiugo-Abanihe, 1989; Fagnon, Sinzogan, Souza-Ayari, 1994; Goody, 1982; Isiugo-Abanihe, 1985; Oppong and Bleek, 1982; Schildkrout, 1973).

The second explanation that Ainsworth tests is whether households decide to send out children as a strategy for educational investment when local opportunities are limited. Her empirical findings can only explain the receiving household's decision; they are inconclusive with respect to the sender's motivations. Although she is unable to confirm this educational investment hypothesis for child fostering, several sociologists and demographers have provided evidence to support this theory (Chernichovsky, 1985; Goody, 1982; Gould, 1985; Page, 1989). In subsequent research, economists using World Bank Living Standards Measurement Survey data from Ghana (Benin, 1998) and South Africa (Zimmerman, 1999) show that educational investment can explain some instances of fostering.

anthropometric measures in the receiving household compared to being with their parents. I am currently trying to quantitatively measure these welfare differences between children living with their parents and foster children.

The child fostering literature in economics has been able to explain either the household decision to send out a child or the household decision to receive a child. However, sending a child for educational reasons and receiving a child for domestic labor reasons do not simultaneously explain the fostering decision for a particular pair of families exchanging a child. For example, anecdotal evidence suggests that if a family receives a foster child for household labor reasons, it is unlikely the child will attend school (UNICEF, 1999; Anti-Slavery International, 1994). Research by Psacharopoulos (1997) and Boozer and Suri (2001) provide evidence that there is a tradeoff between children working more hours and having lower educational outcomes. Given this evidence, a household might want to receive a child for domestic labor reasons, but what motivates the paired household to send out their child? Based on my findings, it appears that households are willing to send out a child if the sending household is faced with a negative agricultural shock or if the sending household has a demographic imbalance that it wants to adjust.

This paper contributes to three distinct literatures: child fostering, risk-sharing, and networks. The contribution to the child fostering literature is to resolve the aforementioned puzzle about the simultaneous motivations for sending and receiving households. With respect to the risk-sharing literature, none of the empirical economics research has tested whether households use child fostering as a risk-coping mechanism. However, outside of economics, sociologists and demographers have provided evidence that households actually use fostering as a way to deal with uncertainty and risk (Bledsoe and Isiugo-Abanihe, 1989; Brydon, 1979; Etienne, 1979; Goody, 1982). Locoh (1997) and Piche and Poirier (1990) argue that fostering is used to reduce household expenses, particularly for those households that have limited resources and are therefore more vulnerable. One economist develops a theoretical model that shows that risk might motivate households to foster children, but is unable to empirically test the model (Serra, 1996).

This article extends the risk-coping literature by providing evidence for another mechanism that households adopt to deal with adverse shocks and income fluctuations. Researchers have documented that, in risky environments, households use the following methods to cope with exogenous shocks: informal credit markets (Udry, 1994), migration and marriage strategies (Paulson, 2000; Rosenzweig and Stark, 1989), livestock sales (Fafchamps, Udry and Czukas, 1998; Rosenzweig and Wolpin, 1993), and gifts and transfers from relatives and neighbors (Fafchamps and Lund, 2001; Goldstein, 2000).[3] To my knowledge, this is the first empirical economics paper to discuss fostering as a household

[3]This paper does not try to explain or understand mechanisms besides child fostering that the household might use in response to a given shock. A related paper I am currently working on attempts to understand exactly which mechanisms households adopt in response to a negative shock. For example, the household can undertake dry season activities in order to supplement its income. The members can ask family and neighbors for gifts or loans to help them cope with the bad times. Members can also sell some of their assets, in particular livestock, to deal with the shock. Finally, it appears that once the household has exhausted these other risk-coping mechanisms, it can decide to send out a child to reduce the burden on household finances and food supply.

risk-coping strategy.

The third literature this paper will contribute to deals with networks and social capital. Previous research in this literature has studied the role that social networks play in workers locating jobs (Granovetter, 1973; Montgomery, 1991) and the role of networks in the decision to migrate (Massey, Alarcon, Durand, and Gonzalez, 1987). Further work by Espinosa and Massey (1997) tried to quantitatively measure social capital. In this analysis, I apply the concept of social capital and networks to the household sending decision. I posit that the network of potential receiving households, in particular their quality, matters for the sending decision. Those households that have better immediate family network members in terms of occupation, marital status, education, and a closer relationship with the sending household are more likely to be able to use the social capital in their network in order to increase the probability that they send out a child. I develop two quantitative measures of network quality and find that both influence the household's sending decision, with a household being more likely to send out a child if it has a better quality network.

The rest of this paper is organized in the following way. Section 2 describes the theoretical model explaining the household sending decision. In section 3, I describe the empirical setting where I collected these data. Section 4 presents the empirical results testing the theoretical model and section 5 concludes.

2 Theoretical Model of Household Sending

The theoretical model examines how risk, network quality, and family structure affect the sending household's decision to foster a child. In section 2.1, I begin by developing a simple theoretical model with one time period and that has only one other potential receiving household j in household i's network. In section 2.2, I extend the model to include first two other potential receiving households j and k in household i's network and then m potential receiving households in household i's network.

2.1 Single Network Member

I assume that household i maximizes profits and has a production function that depends only on adult and child labor. Capital is not considered in the model since very few households in the survey area use capital inputs such as animal traction or chemical fertilizer. Production is assumed to be separable in adult and child labor, which allows me to restrict analysis to the household decision regarding just child labor. The production function for household i accounting only for child labor is $G_i(L_i^c)$, where L_i^c represents the number of resident children in household i. The production function is standard in the sense that it is increasing and concave in child labor, $g_i^{'}(L_i^c) > 0$, $g_i^{''}(L_i^c) < 0$. Child labor for household i, L_i^c is equal to $K_i - F$, with K_i representing the number of household i's own biological resident children and F, the number of foster children. In this model, F is defined to be positive but is not limited

to just integer values. A slightly more complicated model that imposes an integer constraint on F would qualitatively give the same results regarding the Pareto efficient allocation of children in the network, except there would be a wedge driven between optimal fostering and actual fostering. Likewise, another complication to the model would treat both K_i and F as vectors where the extra dimension would represent the different age and sex classes the children could be in, such as boys or girls 0 to 4, boys or girls 5 to 10, boys or girls 11 to 15, and boys or girls 16-18. In the current model, there is direct substitutability between a foster child of any age and sex and the household's own biological child. If K_i and F were treated as vectors, there would only be direct substitutability between foster children and own biological children that are in the same age and sex class.

Households face an independent, identically distributed, random, exogenous shock to production, $\theta_i \in [0, 1]$, that is best thought of as local micro-climate weather shocks, pests, or animals destroying some part of the household's production. High values of θ_i would be considered a large positive shock while low values of θ_i would be considered a large negative shock. In this model, the realization of the household's shock is observed prior to their decision regarding their desired level of fostering. The household faces a fixed cost of production for each child, c, which might include food, clothing, shelter, and medical care.

The problem facing household i is to choose a level of child fostering (how many children to send out) that will maximize the revenue from children minus their costs, as follows:

$$\underset{\{F\}}{Max}\ \theta_i G_i(K_i - F) - c[K_i - F] \tag{1}$$

If this were the entire story, a profit maximizing household that is determining whether to send a child would equalize the marginal cost from sending the child, $\theta_i \frac{\partial G_i(K_i - F)}{\partial F}$, (represented by the reduced output to household production) and the marginal benefit from sending the child, c (represented by the reduced expenses such as food, clothing, and medical care that the household would no longer incur). For household i to want to send a child, it must be the case that evaluating the marginal benefits and costs at the no fostering outcome, $F = 0$, shows that the marginal benefit to the household from increased production when they keep the child is less than the marginal cost incurred. In this case, since the child costs more than he produces, sending the child will increase the marginal production by lowering the number of household workers.

However, even if household i wants to send a child, there is not an actual market for foster children. Therefore, the household must have a household j in their network that wants to receive the child. The fact that the potential receiving household j must have higher profits from receiving the child compared to not receiving the child adds another constraint to the above maximization problem. I assume that household j has a production function that can be different from household i, $G_j(L_j^c)$, where L_j^c is the number of resident children in household j and is equal to $K_j + F$. Household j faces the same fixed cost of production for each child, c, but might receive a different exogenous shock, θ_j.

The constraint can be written as follows:

$$\theta_j G_j(K_j + F) - c[K_j + F] \geq \theta_j G_j(K_j) - c[K_j] \tag{2}$$

where the left hand side of the inequality is the benefit from receiving the child (production with the additional foster child minus costs with that additional child) and the right hand side is the benefit from not receiving the child (production with just own biological children minus costs of own biological children). Rewriting the maximization problem by incorporating this constraint and defining the Lagrange multiplier, λ, to be the Pareto efficient welfare weight between households i and j in network N yields the following:

$$\underset{\{F\}}{Max} \{\theta_i G_i(K_i - F) - c[K_i - F]\} + \lambda \{\theta_j G_j(K_j + F) - c[K_j + F] - \theta_j G_j(K_j) + c[K_j]\} \tag{3}$$

In the case of an interior solution, taking first order conditions and rearranging yields:

$$\lambda = \frac{\left(\theta_i \frac{\partial G_i(K_i - F)}{\partial F_{F=F^*}} - c\right)}{\left(\theta_j \frac{\partial G_j(K_j + F)}{\partial F_{F=F^*}} - c\right)} \tag{4}$$

In equilibrium, household i will choose a fostering level, $F = F^*$, to equate the welfare weight to the ratio between the sending and receiving households of the difference between marginal benefit and marginal cost.

In order to observe household i sending a child to household j, $F^* > 0$, the following two conditions must be satisfied, both of which can be seen in Figure 1. First, it must be the case that household i wants to send a child. As discussed above, the marginal benefits from keeping the child must be less than the marginal cost from keeping the child, $\theta_i \frac{\partial G_i(K_i - F)}{\partial F_{F=0}} - c < 0$. This corresponds to point 1 in the top diagram of Figure 1. Second, household j must want to receive the child. This means that, without the foster child, the marginal benefit from household production is greater than the marginal cost, $\theta_j \frac{\partial G_j(K_j + F)}{\partial F_{F=0}} - c > 0$, and to equalize marginal benefit and cost, household j wants to increase the number of children, thereby lowering the marginal benefit. This condition corresponds to point 2 in the top diagram of Figure 1. If these two conditions are met, meaning that c lies between the y-intercepts for the two curves (points 1 and 2 in Figure 1), then there are Pareto improving gains for each household from fostering. Given that fostering is defined as a continuous variable in this model, if the two conditions are satisfied, household i will send children to household j, $F^* > 0$.

Understanding Figure 1 can help explain how many children household i will send to household j. In the top diagram, the curve for sending household i is upward sloping and represents the marginal production of children in household i, $\theta_i \frac{\partial G_i(K_i - F)}{\partial F}$. As the number of children sent increases, the number of child laborers for household i decreases, thereby increasing the marginal product. For

household j, the marginal product is downward sloping because as the number of foster children received increases, the number of child laborers in their household increases, thereby decreasing the marginal product.

The bottom diagram graphs each household's profit, which will be a concave function, against foster levels. For household i, maximum profits will occur where $F = F_i^*$, when the marginal benefit and marginal cost of sending a child are equal (corresponding to point 3 in the top diagram). The maximum for household j's profit function can either be to the left or right of F_i^*. In the figure, the maximum profits for household j is drawn to the right of F_i^*, at the fostering level $F = F_j^*$ where marginal benefit equals marginal cost (point 4 in the top diagram). In the bottom diagram, the fostering level $F = F_i^{max}$ is the point at which household i would be indifferent between sending no children and sending a positive amount of children.

In Figure 1 where both households want to exchange children, the solution to the maximization problem shows that the optimal fostering level, F^*, will be greater than F_i^* and less than F_i^{max}. To the left of F_i^*, household i will still want to send out more children because the marginal benefit is less than the marginal cost, and household j will still want to receive more children because its marginal benefit is greater than marginal cost. Household i will not want to send out more children than F_i^{max} because to the right of this point, it would have lower profits than it would by sending no children. Determining the exact level of fostering between F_i^* and F_i^{max} depends on λ. Larger values of λ, implying a greater Pareto welfare weight for household j, mean that optimal fostering will be closer to F_i^{max}. For $\lambda > 0$, then at the optimal fostering level it must be the case that the numerator and denominator of the first order equation are both positive, $\theta_i \frac{\partial G_i(K_i - F)}{\partial F_{F=F^*}} - c > 0$ and $\theta_j \frac{\partial G_j(K_j + F)}{\partial F_{F=F^*}} - c > 0$. This means that household i is to the right of F_i^* and wants to reduce sending, and household j wants to increase sending to move closer to F_j^*. At this point, there are no longer any Pareto improving welfare gains to be made from exchanging children.[4]

Household i will not send a child, $F^* = 0$, if either household i does not want to send (in the graph, their y-intercept would be above c) or household j does not want to receive (in the graph, their y-intercept would be below c). From the graph, it is also possible to see that three distinct factors will increase the probability that household i will send a child. First, the size of the shock that household i experiences, θ_i, will have a direct effect on the probability that household i sends a child. A worse shock for household i (meaning a smaller θ_i) would shift the y-intercept down and would flatten the slope of the marginal

[4]The solution to the maximization problem will be slightly different for the case where household j's maximum profits, at F_j^{**}, are achieved to the left of F_i^* (not shown in diagram). In this case, the optimal fostering level will be greater than F_j^{**} and less than F_i^*. To the left of F_j^{**}, household j will want to receive more children and household i will want to send more children. Household j will not want to receive more children than F_j^{max} because to the right of this point, it would have lower profits than it would by receiving no children. If F_j^{max} is to the right of F_i^*, then the level of fostering will be determined by λ and will lie between F_j^{**} and F_i^*. If F_j^{max} is to the left of F_i^*, then the level of fostering will still be determined by λ, but will be between F_j^{**} and F_j^{max}.

product curve. The new optimal fostering level where marginal benefits equal marginal costs, F_i^{**}, would be larger than F_i^*. Second, an increase in the number of household i's own biological children will increase the probability of household i sending a child. An increase in K_i will shift household i's marginal product curve down because with more biological children, the number of child laborers increases, thereby decreasing the marginal product. Third, a reduction in the correlation between household i and household j's shocks will increase the probability that household i sends a child. If household i has a negative shock (small θ_i) and household j has a positive shock (large θ_j), this increases the probability that both household i and household j will want to foster a child. The marginal product curve for household i will shift down and for household j will shift up, and the chance that c lies between the y-intercepts (points 1 and 2) of these two curves increases. If the correlation between household i's shock and household j's shock was 1, meaning both households had the same shock, the difference between points 1 and 2 would only be due to differences in household demographics. A network quality measure that approximates the correlation between the households' shocks would indicate how well the potential receiving household did in relation to the sending household, and this should be a reliable predictor for the probability of household i sending a child.

2.2 Multiple Network Members

Extending the model to include a second potential receiving household k in household i's network adds an additional constraint to the maximization problem that household k must be better off receiving the foster child than not receiving the child. With this second potential receiving household, it is also necessary to change the notation slightly to account for the fact that household i can send children to either household j or household k. Household i chooses whether to send children to household j or household k in the following maximization problem:

$$\begin{aligned}\underset{\{F_{ij},F_{ik}\}}{Max}\ & \theta_i G_i(K_i - F_{ij} - F_{ik}) - c(K_i - F_{ij} - F_{ik}) \\ & + \lambda_{ij}\left[\theta_j G_j(K_j + F_{ij}) - c(K_j + F_{ij}) - \theta_j G_j(K_j) + c(K_j)\right] \\ & + \lambda_{ik}\left[\theta_k G_k(K_k + F_{ik}) - c(K_k + F_{ik}) - \theta_k G_k(K_k) + c(K_k)\right] \quad (5)\end{aligned}$$

where F_{ij} is the foster children sent from household i to household j, F_{ik} is the foster children sent from household i to household k, λ_{ij} is the Pareto welfare weight between household i and household j, and λ_{ik} is the Pareto welfare weight between household i and household k. Taking first order conditions with

respect to F_{ij} and F_{ik} yields the following two first order conditions:

$$\lambda_{ij} = \frac{\left(\theta_i \frac{\partial G_i(K_i - F_{ij} - F_{ik})}{\partial F_{F=F^*}} - c\right)}{\left(\theta_j \frac{\partial G_j(K_j + F_{ij})}{\partial F_{F=F^*}} - c\right)} \tag{6}$$

$$\lambda_{ik} = \frac{\left(\theta_i \frac{\partial G_i(K_i - F_{ij} - F_{ik})}{\partial F_{F=F^*}} - c\right)}{\left(\theta_k \frac{\partial G_k(K_k + F_{ik})}{\partial F_{F=F^*}} - c\right)} \tag{7}$$

The results in this extended model are qualitatively similar to those in the case of only one potential receiving household. For household i to send a child, it must be the case that both household i wants to send a child and either household j or household k (or both) want to receive the child. Increasing the number of potential receiving households increases the probability that if household i wants to send a child, it can find a household that wants to be the receiver. With two potential receiving households, there is a greater likelihood that the correlation of household i's shocks with either of the other household's shocks will be low. Reducing the correlation with either household j or household k increases the probability that household i will send a child.

Further extending this model to include m potential network members would entail adding additional Pareto welfare weights for each network member, λ_{im}, where network member $m = (1, 2, 3, ..., m) \in N$ and adding variables measuring fostering between household i and each of the m potential receiving households. Even in the extended model, it will still be the case that the three distinct factors discussed earlier, shocks, demographics, and network quality, will each influence the probability of household i sending a child.

3 Empirical Setting

Testing this theoretical model requires detailed information on networks, household risk-coping mechanisms, and foster children's placement. Because currently existing data from Africa are not adequate for testing this model, I spent 18 months in Burkina Faso conducting household surveys to gather the necessary information.[5] Burkina Faso was selected for this study for two reasons. First, according to UNICEF (1999), Burkina Faso is thought to be a major supplier of foster children, many of whom are sent to Cote d'Ivoire, and therefore understanding the household decision to send out children has important policy implications for the region. Second, institutional collaboration with Unite d'Enseignement et de Recherche en Demographie in Burkina Faso's capital, Ouagadougou, provided additional support to the data collection process including access to village maps and detailed ethnographic information about the villages.

[5]More detailed information about the fieldwork, including the survey instruments, field enumerator training manuals, project reports, and final report can be found on the website: http://www.econ.yale.edu/~rsa7 (currently under construction).

The fieldwork component of the project improved on previous economic studies in several ways. First, I adopted an innovative methodology that involved tracking households on both the sending and receiving ends of a particular fostering exchange. For example, if in the first phase we interviewed a household that had sent a child to another family, then in the second phase, we found that receiving household and interviewed them. Similarly, if in the first phase, we interviewed a household that had received a child, then in the second phase, we found and interviewed the biological (sending) parents of the child. This method enabled me to test the implications of the theoretical model, in particular whether fostering was due to transitory components, such as shocks, or permanent components, such as wealth, of the households. Second, I began the project with an extensive qualitative phase where I conducted focus group discussions as well as semi-structured, individual interviews to help me develop and informally test different hypotheses that might explain child fostering. Third, with the help of two Burkinabe researchers, I organized a field enumerator training session that lasted three weeks. Part of the training focused on teaching the enumerators how to offer suggestions for improving the survey instrument throughout the data collection period. This training session was part of a larger iterative approach to the fieldwork process (for details, see Udry, 2003). Fourth, I implemented a system of double data entry where every survey was entered two times and a computer program compared the two entries, resulting in a report listing any discrepancies between them. A data entry supervisor and several research assistants then checked the original questionnaire to correct these errors.

The fieldwork was organized into two distinct phases. For the first phase of surveying, fifteen rural villages were selected in Bazega province located approximately fifty miles from Ouagadougou. In these villages, the unit of analysis for the sampling frame was the compound.[6] Within each compound, an enumerator individually interviewed the head of every household and then separately interviewed all of his wives (if applicable).[7] Households in this region consist

[6]Since only one in four households had fostered a child during the past three years, I adopted a two part sampling frame in order to increase the sample of households making a fostering decision. Immediately prior to the survey, the enumerators conducted a compound level census in each of the 15 villages. The first part of the sampling frame consisted of randomly selecting 15 compounds in each village. The second part of the sampling frame consisted of randomly selecting 9 additional compounds in each village from those compounds not yet selected, now with the requirement that each of these compounds had fostered a child during the past 3 years. Due to the fact that some villages did not have 9 additional foster compounds remaining after the random selection was drawn, in those villages that did have more than 9 additional foster compounds remaining, I randomly selected more than 9 foster compounds for the second part of the sampling frame. A total of 383 compounds containing 606 households were selected. All results in this paper use the entire sample, but results are quantitatively similar when restricting the observations to just the random sample.

[7]To determine how to assign every individual living in the compound to a specific household, enumerators asked the following sequence of questions. 1. Who is the head of the compound? This individual and his wives (if applicable) will constitute the first household. 2. Are there other individuals, besides the head of the compound and his wives, that were still married as of 12/31/00 (the ending date for the three year survey period). If there are, each man and his wives would constitute an additional household. 3. Are there other remain-

predominantly of subsistence farmers growing millet, sorghum, and groundnuts and have an average annual income of $175. On average, households have 10.6 members consisting of 1 head of the household, 1.5 wives, 3.6 children under age 18, 3.2 children over age 18, and 1.3 members that might include the respondent's mother, brothers, sisters, grandchildren, distant relatives, and individuals with no direct relationship.

The second phase of the survey consisted of finding the paired households that had exchanged a foster child and interviewing the head of each household along with all of his wives using the same survey instrument from the first phase. I restricted this tracking to those households that had exchanged a foster child during the previous three years and where the child's age at the time of fostering was between five and fifteen. Children aged zero to four were excluded from the tracking because of two reasons. First, other researchers studying child fostering in Africa have argued that the reasons for sending young children are different than for older children (Vandermeersch, 2002; Lallemand, 1976). In particular, children under age five are not routinely performing domestic chores and are essentially just consumers. Around the age of five, children are expected to become economically helpful to the family, undertaking tasks in the household, in the fields, and in the market place. It is at this point that households would now be concerned with offsetting demographic imbalances in the number of their children of a given age and sex. Second, 1993 Demographic and Health survey data from Burkina Faso indicate that fostering of young children is much less common than older children. Results from this survey confirm that finding, showing a particular jump in fostering rates at age six (Appendix Table 1). Children aged sixteen and seventeen were also excluded from the tracking because, at that age, most villagers in rural Burkina Faso would consider them adults. They are physically mature, have passed initiation rites for their culture, and the women are of an acceptable age for marriage. In addition, for older children, it becomes difficult to disentangle what is a case of child fostering and what is an example of households splitting off members to form distinct and separate households.

For the tracking phase, approximately sixty percent of the paired households were located within a twenty-five mile radius of the first phase villages, twenty-eight percent were located in the capital, eight percent were in Cote d'Ivoire, and

ing individuals in the compound, not yet assigned, who had once been married and whose marital status (widowed, divorced, separated) changed during the three previous years. Each of these individuals would constitute an additional household. 4. Are there other remaining individuals in the compound, not yet accounted for, who had once been married and whose marital status changed more than three years ago and the individual does not depend on the head of the compound or another household head in the compound. Each of these individuals would constitute an additional household. 5. Are there other remaining individuals in the compound, not yet accounted for, who have never been married and who do not depend on the head of the compound or another household head in the compound. Each person satisfying this criteria would constitute an additional households. This household definition was implemented to ensure that individuals in the compound who might have been involved in making a fostering decision would be interviewed. Under another household definition, such as members who eat from a common pot are part of a single household, these individuals might not have been interviewed.

four percent were scattered across the other provinces of Burkina Faso. In total, there were 316 paired households to be found in the second phase of surveying and we were able to find 300 of these households (a 94.9 percent success rate).

To test the hypothesis that network quality matters for the household level decision to foster a child, I designed the survey to collect detailed information on several dimensions about the households that could be involved in sending or receiving a child. To accurately test the theoretical model, I would need information about the shocks that each potential receiving household experienced. During the pre-testing of the survey instrument, I made numerous efforts to collect this information but respondents were unable to answer detailed questions about the shocks their immediate family members experienced. Ultimately, the survey includes information on immediate family members' characteristics, such as their geographical location, occupation, marital status, education, the number of their children currently enrolled in school, relationship to the respondent, and their household demographics including the number of boys and girls age 0 to 5, 6 to 10, and 11 to 15.

The network space that a household could potentially send a child to is limitless. Any other household is a potential receiver. However, I limit these detailed questions to only immediate family members that are not co-resident (parents, brothers, sisters, and adult children) instead of all network members for two reasons. First, based on the qualitative interviews I conducted prior to the survey, I found that a large proportion of child fostering occurs between immediate family members. After the survey, it turned out that sixty-two percent of all foster children in the sample were sent to or received from immediate family members. Second, it became obvious during the pre-testing of the survey instrument that the respondents were unable to answer these types of questions in a timely manner if the questions pertained to individuals other than immediate family members, such as distant relatives, friends, or acquaintances.

How households react to changes in their economic environment is inherently a dynamic process, and I would ideally want to have panel data in order to observe this process over time. However, given the time burden associated with collecting panel data, I adopted an alternative data collection strategy that entailed collecting retrospective information covering the 3 years prior to the survey interview. In addition to information about network members, the data contain detailed questions about agricultural production for every crop the household grew during each of three years (1998, 1999, and 2000). There is also information about each biological child in the respondent's household and if the child was sent out at any time, questions are asked determining the relationship between the sending and receiving households, the timing of the fostering, and the location of the receiving household.

4 Estimation Results

Following the theoretical model discussed earlier, the goal of the empirical section is to test the role of risk, family structure, and network quality in the

household level decision to send out a child in a given year. The first step in this process is determining how to measure network quality. Based on the theoretical model, I would ideally use the covariance of exogenous shocks experienced by each member in the network as a measure of the network's overall quality. However, since it was not possible to collect this information, the empirical analog to the covariance measure of shocks are the following predicted network quality measures. These measures capture how closely correlated the network member's income stream is with the sending household and therefore serve as a proxy for the covariance measure of shocks.

Using the sociology literature as a rough guide (Espinosa and Massey, 1997), I first try to understand which characteristics about a network member help to explain why that particular network member was selected to receive a given foster child. This first stage analysis is restricted to only those households that have sent out a child. In the second stage, I calculate an out-of-sample prediction for every network member in the sample using the estimated coefficients from the first stage regression. This allows me to estimate the probability that a given network member would be selected to receive a child based on that individual's characteristics. I then calculate two different measures of the quality of a household's network. In the first measure, I calculate the number of network members whose predicted value of being selected is above some high threshold level. The second measure uses these predicted values to create a quality-weighted measure of the number of individuals in the household's network. The intuition is that if a household has more good members in their network, either as a count or as a quality-weighted number, they will be more likely to send out a child. The third stage of the analysis estimates the household level decision to send a child in a given year as a function of household level agricultural shocks, the network quality measure, and variables measuring the household's demographic characteristics. The empirical results are consistent with the theoretical model. Households that experience a worse agricultural shock in a given year or that want to offset household level demographic imbalances in the age and sex composition of their children are more likely to send out a child. Finally, conditional on a given household shock and demographics, households that have a better quality network of potential receivers are also more likely to send out a child.

4.1 Selection of a Network Member

In the first stage, the question I am trying to answer is conditional on a household sending out a child to an immediate family member, why did they select that particular member to receive the child. The dataset I use for this analysis consists of 2395 observations with each observation being an individual immediate family member. To be included in the dataset, the network member must be an immediate family member from a household that sent out a foster child during the last 3 years. The dataset includes households from Phase 1 that sent a child and households from the second tracking phase that sent a child (and in

that case the Phase 1 households were receivers).[8] Appendix Table 2 contains summary statistics for some of the variables used in the first stage regression.

Analyzing descriptive statistics about network members' occupation and relationship to the respondent provides preliminary evidence about what factors influence this selection decision. Table 1 shows that a much higher percentage of immediate family members who are business people are selected to receive a child when compared to immediate family members who are retired, unemployed, or housewives. Most immediate family members are farmers (72.4 percent), but immediate family members who are farmers are selected to receive a foster child at a much lower rate than business people. Calculating a t-test to see if the percentage of farmers selected to receive a foster child (6.46 percent) is different from the percentage of business people selected to receive a foster child (10.34 percent) shows they are significantly different with a p-value of 0.039. Table 2 shows that a higher percentage of the respondents' parents are selected to receive foster children compared with the respondent's brothers and sisters. It is also true that a higher percentage of the respondents' adult children are selected to receive a foster child when compared with the percentage of brothers and sisters selected.

4.1.1 Logit specification for estimating network member selection

I estimate this network member selection regression first using a logit model and then second using a child-level fixed effects logit. In the first specification, I run a logit regression where I estimate the following equation:

$$Prob(Selected_{cm} = 1|X_{cm}) = \frac{exp(\beta_0 + X_{cm}\beta)}{[1 + exp(\beta_0 + X_{cm}\beta)]} \tag{8}$$

where $Selected_{cm}$ is defined as a dichotomous 0,1 variable with a value of 1 indicating that the individual network member m was selected to receive the foster child c, and the explanatory variables, X_{cm}, for network member m relating to foster child c are described below. 6.76 percent of the network members in this selected sample were chosen to receive a foster child. The logit regression is estimating the probability that an individual network member was selected to receive a foster child as a function of both that individual's specific personal characteristics and the joint characteristics about the particular match of sending a child to that network member. The personal characteristics include occupation, relationship to the sending household, marital status, whether the network member attended school, whether the network member has children currently enrolled in school, whether the network member's household had a birth during the previous three years, and variables measuring the age and sex distribution of the children of the network member. Variables that attempt to capture what is unique about the match between these two potential foster

[8]Immediate family data include information on both the mother and father of the respondent. However, for this analysis, the mother's observation was omitted if the father was still alive and the parents were co-resident in order to prevent double counting that household.

households include age and sex indicators for the child being sent and interactions of age and sex dummies for the child sent out with age and sex dummies for the network member's children.

Results for the logit regression (Table 3, column 1) show that characteristics of a given network member and the quality of the match between the two potential exchanging households affect the probability of that network member being selected to receive a foster child. The regression provides preliminary evidence that the sending household is attempting to find the best (measured in some multiple set of dimensions) receiving household for their child. If the network member has a good occupation such as being a business person, a bureaucrat, or even just a manual laborer, the member is more likely to be selected. However, if the network member is a housewife, retired or unemployed, then the member is less likely to be selected to receive a child. The omitted occupation variable is farmer. Calculating the marginal effect of a change in the probability of being selected due to an incremental change in the independent variable from its mean shows that network members are 4.2 percent more likely to be selected if they are business people and 5.7 percent less likely to be selected if they are retired or unemployed.[9]

In addition, if the network member is either the parent or an adult child of the respondent, then that member is much more likely to receive a child compared with the respondent's sisters or brothers. The marginal effect on the probability of being selected due to an incremental change in the parent relationship variable, holding all other variables fixed, is 8.3 percent. The marginal effect from an incremental change in the adult children variable causes a change of 4.1 percent in the probability of being selected to receive a foster child. If the network member is recently married, widowed or divorced, or has never been married, the member is less likely to be selected compared to a network member that has been married for more than three years. For instance, an incremental increase in the never been married dummy variable will cause a 6.5 percent drop in the probability of being selected. The results for these individual characteristic variables indicate that the receiving household is more likely to be someone with a good occupation, in a stable marital union, and with very close blood ties to the respondent.

Educational investment is often cited as an explanation for sending a child and some of the sociological literature argues that sending households therefore often look to find the most educated network member to receive their child, because if the network member is educated, he is more likely to realize the importance of education and keep the foster child in school. Similarly, the sending household might look to find a network member that lives close to a primary school to ensure their own child's schooling. However, while the

[9]The marginal effect for an incremental change in an independent variable, x_i, evaluated at the mean of the variable, in the logit specification is calculated as:

$$\frac{\partial P(x)}{\partial x_i} = \frac{exp(\widehat{\beta_0^{logit}} + \overline{X_{cm}}\widehat{\beta^{logit}})}{[1 + exp(\widehat{\beta_0^{logit}} + \overline{X_{cm}}\widehat{\beta^{logit}})]^2}\widehat{\beta^{logit}}$$

coefficient on the variable indicating whether the network member attended school is positive it is not statistically different from zero. In addition, the variable indicating whether the network member's own children are currently enrolled in school is also not significant.

Sociologists have argued that having no children, a limited number of children, or too few children of a particular sex are situations where households might attempt to foster in a child to make up for these shortcomings (Lallemand, 1980; Jonckers, 1997). Results from this regression seem to indicate that the demographics of the network members' children matter for the receiving decision. Network members that have boys 0 to 5 and 6 to 10 are significantly much less likely to be selected to receive a child, and network members that have girls 0 to 5 and 11 to 15 are also less likely to be selected but those variables are not statistically significant. However, the variables indicating whether the network member had a baby during 2000 or 1999 are negative but are not significantly different from zero and do not appear to influence the probability that the network member is selected.

In terms of the variables that describe the joint characteristics about a particular match of two potential foster households, the results seem to indicate that sending households are more likely to select households to receive their child that have different age and sex characteristics from the child being sent. In terms of the regression coefficients, this implies first that the coefficients on the age and sex interaction terms should be positive if the potential receiving household has a child with a different age or sex than the child being sent, and second that the coefficient on that interaction term should be negative if the potential receiving household has a child with the same age and sex as the child being sent. It must be noted that because the number of households that are selected and that take the value of 1 for a given interaction variable is very small, the regression does not have a lot of power to identify these interaction coefficients. Therefore, these coefficients qualitatively support the above description but in only several cases are the coefficients actually statistically significant. In more detail, if the child sent is a boy 5 to 10 years old, then households that have younger or older boys or that have girls of any age are more likely to be selected to receive the foster child. This contrasts with the case where households are less likely to be selected to receive the foster child if the household has a boy 5 to 10 years old and the child sent is also a boy of this age. If the child sent is a boy aged 11 to 15, then households with girls aged 0 to 5, girls aged 11 to 15, or boys aged 0 to 10 are more likely to be selected. Likewise, if the child sent is a girl aged 11 to 15, then households with boys 5 to 10 or boys 11 to 15 are more likely to be selected. In contrast to the other interaction terms, the results when the child sent is a girl aged 11 to 15 indicate that households that have younger girls aged 0 to 10 are less likely to be selected perhaps because the younger girls are seen as substitutes for the older foster child. It seems that receiving an additional boy if the network member does not have a boy in that age category is a positive thing, but having additional girls is viewed as redundant.

4.1.2 Child level fixed effects logit specification for estimating network member selection

In addition to estimating the network member selection regression using a logit specification, it seems likely that there are certain unobserved factors that are unique to a given foster child and the network where the child could be sent. This unobserved child heterogeneity might include any factors about the child besides the child's age and sex (which are already controlled for) that influences the likelihood that a potential network member is selected. Possible factors might include the personality of the child, whether the child is hard-working, or the child's ability to do certain tasks. I attempt to deal with this unobserved child heterogeneity by estimating the network member selection regression with a child level fixed effects logit specification as follows:

$$Prob(Selected_{cm} = 1|X_{cm}) = \frac{exp(\alpha_c + X_{cm}\beta)}{[1 + exp(\alpha_c + X_{cm}\beta)]} \tag{9}$$

where the dependent and independent variables are as defined previously and α_c represents the fixed effects for foster child c. Furthermore, let the subscript for the foster child $c = 1, 2, ..., n$ denote the groups and the subscript for the network member $m = 1, 2, ..., M_c$ the observations for the i^{th} group. In this nonlinear model, it is not possible to eliminate the unobserved heterogeneity, α_c, by taking deviations from group means. Chamberlain (1980) proposes a different approach to estimating this model whereby we maximize the conditional likelihood function abbreviating $Selected_{cm}$ as Y_{cm}:

$$L^c = \prod_{c=1}^{n} Prob(Y_{c1} = y_{c1}, Y_{c2} = y_{c2}, ..., Y_{cM_c} = y_{cM_c} | \sum_{m=1}^{M_c} y_{cm}) \tag{10}$$

The results from the child level fixed effects logit are presented in Table 3, column 2 and both coefficient estimates and standard errors are similar to the results from the logit regression. It is still the case that network members who have a good occupation, closer direct blood ties with the sending household, and a long-term, stable marital situation are more likely to be selected to receive the foster child. In the fixed effects specification, network members that have attended school are more likely to be selected to receive a foster child compared with the logit specification, with the coefficient estimate falling shy of normal significance levels. Coefficient estimates for the variables describing the network members' household demographics and whether the network member had a baby during the previous three years are very similar in both specifications. In addition, similar results are seen when comparing the coefficients for the terms interacting network members demographics with the age and sex of the foster child.

Despite the coefficient estimates and the standard errors being similar, the fixed effects specification produces a better explanatory fit for the data. A pseudo-R^2, calculated as $1 - \frac{L1}{L0}$ (where $L0$ and $L1$ are the constant-only and full model log likelihoods respectively), provides an approximate estimate of

the model's explanatory power. The pseudo-R^2 is equal to .210 for the fixed effects model and .149 for the logit model. It is possible to test whether there is actually unobserved heterogeneity in the model using a likelihood ratio test to compare the fixed effects logit and the logit specification. Under the null hypothesis of homogeneity, both Chamberlain's conditional fixed effects logit and the maximum likelihood logit are consistent, but the fixed effects logit is inefficient. Under the alternative hypothesis of unobserved heterogeneity, the unconditional logit is inconsistent, but the fixed effects logit is consistent and efficient. I calculate the likelihood ratio test statistic as $2(L_{ChildFELogit} - L_{Logit})$ where $L_{ChildFELogit}$ is the log likelihood for the fixed effects logit model and L_{Logit} is the log likelihood for the logit specification. The likelihood ratio test statistic is distributed chi square with the degrees of freedom equal to the number of exclusion restrictions, which is 41 for this regression. The critical value at the 5 percent level is equal to 56.94. Using the log likelihood values reported in Table 3 shows that the test statistic is equal to 360.58 meaning I can reject the null hypothesis of homogeneity. Given that the fixed effects logit provides a stronger fit to the data, I will use that model in the following analysis of network quality.

4.2 Measuring network quality

Building on the understanding of what characteristics play a role in the selection of a particular network member to receive a foster child, the goal of the second stage is to quantify more generally what constitutes a good network. I first develop an intuitive network quality measure that is based on the cross tabulations presented in Tables 1 and 2 discussed earlier. This ad hoc network quality measure attempts to capture these two dimensions of the network, occupation and relationship to the respondent, both of which seem to matter for the fostering decision. Households that have network members that are business people and that have members who are either parents or adult children would be considered as having a good network. The intuition is that if the household has members who satisfy each dimension's criteria (business person for occupation and parent or adult child for relationship), then that household has more choices of people with characteristics favorable to receive a child. Note that this network quality measure does not impose that the household must have a parent who is a business person, but rather the household must have some member who is a parent (or adult child) and some member who is a business person. It is possible those members are the same person, but it is not necessary. Table 5 shows that 51.2 percent of households have a good network as measured in this manner. While this network quality measure is intuitive and does draw on the cross tabulations presented earlier, it is obvious it ignores many of the dimensions about the network in defining its quality, particularly, the variables discussed in Table 3 for the network member selection regression.

To improve on this intuitive network quality measure, I attempt to quantitatively measure the network's quality. Recent sociology research has attempted to quantitatively measure migrant networks as a form of social capital (Espinosa

and Massey, 1997). They argue that social capital is not a dichotomous yes or no measure as previous researchers have treated it, but rather it varies in terms of quality and quantity. Applying the prior sociology research to the household decision to send a child would imply that simply counting the number of members in a household's network would be sufficient for measuring the network. However, the current sociology research argues that both the quantity and quality of network members is important. The quality of social capital is defined as how likely a potential network member is to receive the sending household's child in terms of occupation, marital status, relationship to sending household, their own household demographics, and any other factors that would influence the sending decision. The quantity of social capital would be the number of network members for a given level of quality, in effect the number of good network members. I attempt to operationalize this quantity and quality dimension of social capital in two different ways.

Both methods use a new dataset I created that links each eligible child (aged five to fifteen) in every Phase 1 household with that child's immediate family network members. For example, if a Phase 1 household has five children, of whom four are between the ages of five and fifteen inclusive, and there are ten immediate family network members for this household, then the dataset would contain forty observations for this household (ten observations for each of four children). I then calculate an out-of-sample prediction for every single network member in this dataset using the estimated coefficients from the child level fixed effects logit regression for estimating network member selection. This gives the predicted probability that the network member would be selected to receive the foster child, if the child had been sent, and is based on that member's characteristics and the joint characteristics of the match between the member and foster child. Since this is an out-of-sample prediction, it should be noted that in most cases the child was never sent to any network member and that this exercise is only estimating the probability that the network member would be selected had the child been sent.

Using these out-of-sample predicted probabilities of being selected, I calculate two different measures of the quality of a household's network. The first measure is based on the idea that for a given fostering to occur, the sending household only needs one person to receive the child. Therefore, it makes sense to focus on trying to measure something about the right tail of the distribution of predicted probabilities. Intuitively, if the sending household has more network members with a high predicted probability, then it is more likely to find a household in its network that can receive a child.

For the first measure, I calculate the number of network members that have a predicted probability of being selected above some high threshold level. In particular, I use the 80th percentile of the predicted probabilities as the threshold level. I chose to use this percentile as the cutoff point because in the child level fixed effects logit described above, the average percentile for those network members who were selected is the 79th percentile.[10] In calculating this count

[10]Results are quantitatively similar and robust when using other percentiles as the threshold

of network members above the 80th percentile, several intermediate steps were needed. Each network member has a predicted probability of being selected to receive a given child in the household and if the household has several children, a given network member will have multiple predicted probabilities (one for each child). For a particular network member, it is possible that the predicted probabilities related to some children are above the 80th percentile and some are below. I consider each network member a good network member if he has a predicted probability above the threshold for any child in the sending household.[11] The household level network quality percentile count measure is a sum of the number of network members for this household with predicted probabilities above the threshold.

The second network quality measure is a quality-weighted measure of the number of individuals in a household's network. It differs from the first measure in that it gives positive weight to every person in the sending household's network and therefore to the entire distribution of predicted probabilities. A network member with a very low probability of being selected still influences the quality of the sending household's network. The idea behind this measure is to give extra weight to those network members who have a high probability of being selected and less weight to those network members who have a very low probability of being selected. For each network member, I create a quality-weighted value by dividing the member's predicted probability of being selected by the average probability of being selected for the entire sample. An individual that has a predicted probability equal to the average sample probability will receive a quality weighted of one. Individuals with predicted probabilities larger than the average will receive a quality weighted value greater than one, and similarly, individuals with predicted probabilities smaller than the average will receive a quality weighted value less than one. Intermediate steps in calculating this quality weighted measure are the same as for the previous network quality percentile count measure. Every network member has a quality-weighted value (his own predicted probability divided by the sample average probability) for each child in the sending household. I use the maximum of these quality-weighted values across all children that network member could receive. The household level quality weighted measure is a sum of all the quality-weighted values for the network members for this household.

4.3 Household sending decision

In understanding the household decision to send a child in a given year, there are several distinct strands that need to be considered. The first strand incorpo-

level including the 65th, 70th, 75th, 85th, 90th, and 95th percentiles.

[11] Similar results are derived using an alternative intermediate step where each network member is no longer considered solely as a good member or not. In this alternative, a network member is considered a good member with respect to a given child and this measure is averaged across children. For example, if a network member is a good match for 1 out of 4 children in the household, he would be assigned the value of 0.25. Likewise, if the network member was a good match for all 4 children in the household, then he would be assigned the value of 1.

rates the network quality measures developed in the preceding section. In the different regression specifications estimating the household's sending decision, I include either of the three network quality measures previously explained. The intuition is that if a household has more members in their network that are likely to be selected, measured either as a number of individuals, a quality-weighted index, or in an ad hoc intuitive manner, the household will be more likely to send out a child. Table 4 presents a simple tabulation of the percentage of households that either sent or did not send a child in a given year broken down by whether they have above or below the median number of good matches in their immediate family network. The median number of good matches is four individuals. Households that have a lot of good matches in their network (more than the median number) are more likely to send a child in a given year, with 12.96 percent of these households sending a child compared with only 7.05 percent of households that have a small number of good matches in their network.

The second strand builds on the hypotheses discussed in sociology and demography research that economic crises affect the household's decision to send a child (Locoh, 1997; Piche and Poirier, 1990). Because the respondents surveyed are rural, subsistence farmers, their economic environment and relevant crises are best captured by measures of their agricultural shocks. To calculate a household level measure of agricultural shocks, I use the response to the question, "For each crop grown in a given year, how much of that crop was lost due to an unexpected agricultural shock?". In order to help the respondent answer the question, the field enumerators were trained to provide examples of unexpected agricultural shocks such as animals running through your field, pests, rodents, or fungi destroying the crop, or unexpected weather damage (hail storm). The answers are coded from zero (no loss) to three (a large loss) with the average household shock across all crops for the three years equal to 1.58. The household level agricultural shock variable used in the regressions is an average of the shocks for every crop grown in a given year by that household.[12]

The third strand incorporates demographic research that argues that fostering is a response to a demographic imbalance in a given household (Meillassoux, 1992). Lloyd and Desai (1992) argue that a household with a higher number of younger siblings are more likely to send out a child. To capture these demographic effects on the household's sending decision, I include variables measuring the number of boys and girls aged 0 to 4, 5 to 10, and 11 to 15 in the regression.

These three strands encompass the independent variables influencing the household's decision to send a child. I first estimate this household sending

[12]Results are quantitatively similar and equally robust when using several different measures of household level agricultural shocks. In addition to the agricultural shock measure calculated as an average of the shocks for every crop grown in a given year by that household, I estimate two additional shock measures for subsets of crops. First, I calculate a shock measure averaging the shocks for all grains (millet, sorghum, maize, and rice) grown in a given year by that household. Second, I calculate a shock measure averaging the shocks for just the main staple crops, millet and sorghum, grown in a given year by that household.

decision using the following logit specification:

$$Prob(Sending_{ivt} = 1|X_{ivt}) = \frac{exp(\beta_0 + X_{ivt}\beta)}{[1 + exp(\beta_0 + X_{ivt}\beta)]} \tag{11}$$

where $Sending_{ivt}$ is a 0,1 dichotomous variable taking the value of 1 if household i in village v sent a child aged five to fifteen inclusive during the given year t and 0 otherwise, and X_{ivt} are the variables measuring network quality, agricultural shocks, and household demographics for household i in village v at time t. Using a logit specification loses information that is present in the dependent variable for those households that have sent multiple children in a given year. In order to capture this extra information, estimating the household sending decision using an ordered logit would be more informative where the dependent variable takes the value of zero if no children are sent in a given year, one if a single child is sent in a given year, two if two children are sent in a given year, and three if three children are sent in a given year. However, for this dataset, 91.6 percent of the household year observations have no child sent, 7.4 percent of the household year observations sent one child, 0.9 percent sent two children (seventeen household year observations), and 0.1 percent (one household year observation) sent three children in a given year. Given the small number of household year observations where multiple children are sent in a given year (eighteen observations), using this extra information to estimate an ordered logit does not alter the results.[13]

An overview of the logit regression results shows that households are more likely to send out a child in a given year if the household experiences a worse agricultural shock, has a better quality network where they can send the child, and has more girls aged five to fifteen. The summary statistics for the variables used in the household sending regression are in Table 5. On average, households have just over four individuals in their network who would be considered good matches (having a predicted probability of being selected above the 80th percentile) and approximately twenty quality-weighted individuals in their network. The twenty quality weighted individuals in a household's network are more than the average number of non-quality weighted individuals in their network, which is fifteen. Following the theoretical model, I include the household's history of agricultural shocks (1 and 2 period lagged shocks) in addition to the current shock.

Table 6 presents the marginal effect on the probability of a household sending a child in a given year due to a change in the independent variables from the household sending logit regression. Column 1 uses the network quality measure calculated as the number of members above the 80th percentile, column 2 uses the quality weighted network size measure, and column 3 uses the ad hoc, intuitive network quality measure. In all three cases, households with better

[13]To verify that little is gained by using the information from these households that send multiple children in a given year, in appendix table 3, I estimate the household sending decision using an ordered logit. Coefficient estimates and standard errors are similar to the logit specification discussed below mainly because subsuming the households that sent multiple children in a given year into the category of households sending a single child had little effect.

quality networks (measured either as the number of individuals with a predicted probability above the 80th percentile, as a quality weighted number of individuals in the network, or as a network that has members in both crucial dimensions of occupation and relationship) are more likely to send out a child in a given year. Having an additional immediate family member with a predicted probability above the 80th percentile (an additional good match in the household's network) means the household would be 1.8 percent more likely to send a child in a given year. An increase of one standard deviation above the average number of good matches in the household's network would increase the probability of sending a child in a given year by approximately 3.6 percent. An increase of one standard deviation above the average quality-weighted network size measure for a household would increase the probability of sending a child in a given year by 3.3 percent. An incremental increase in the ad hoc network quality measure would increase the probability of sending a child in a given year by 3.9 percent. The results are significantly different from zero at the 1 percent level for the network quality count measure and at the 10 percent level for the quality weighted network size measure and the ad hoc measure. The sociology literature's emphasis on network quality as an important determinant of a household's decision making seems to be confirmed by these results.[14] In addition, the magnitude of the effect due to network quality is large. With current levels of household sending at 11.0 percent, a one standard deviation increase in the number of good matches in the household's network means there would be roughly a 33 percent increase in fostering.

Both columns also indicate that households that experience worse agricultural shocks in a given year are more likely to send out a child, controlling for the household's history of shocks. A one unit increase (roughly one standard deviation) in the shock measure would increase the probability that a household sends a child by 2.5 percent, 2.7 percent, or 2.9 percent (depending on the network quality measure used in the regression). The results are significantly different from zero at the 5 percent level. Compared to the base level of household sending, a one standard deviation increase in shocks would lead to 22.7 percent increase in fostering. In these regressions, I control for the entire history of shocks that the household faced, which in this dataset is for three years (at time t, time t-1, and time t-2). The coefficients on the 1 period lagged shocks are much smaller and are not significantly different from zero. The two-period lagged shocks are negative and close to being significant. I interpret this to mean that households that had a larger shock two periods ago are less likely to send a child this period because they have already dealt with the effect of the shock. The agricultural shocks' results imply that households are using fostering as a risk-coping mechanism to deal with adverse economic crises.

Analyzing the variables measuring the household's demographics shows that households that have more girls aged 5 to 10 and 11 to 15 are more likely to send

[14] I estimated the same regressions replacing the quality weighted index of network size with just network size. The coefficient on network size is now negative and significant at the 5% level. I interpret this as evidence that controlling for the quality of the network is important for understanding the role the network plays in the household sending decision.

out a child in a given year. There is also a negative effect on the probability of sending a child for households that have more older children aged 16 to 18 or more young children aged 0 to 4. However, the coefficient is significant only for the variable measuring the number of older girls but not the other three variables. In general, the results for the demographics variables are consistent with the demography literature that argues that households use fostering to cope with demographic imbalances and are more likely to send out a child if they have a redundancy of children in a particular age-sex category.

Table 7 presents the results when I do not control for the complete history of agricultural shocks in the regression. Analyzing columns 1 and 2 shows that the results for the agricultural shock variables are generally robust when I only control for 1 period lagged shocks. The main difference is that the coefficient on current agricultural shocks, while still positive, is smaller. Columns 3 and 4 present the results when I only include current agricultural shocks. The marginal effect is considerably smaller and the coefficient is no longer significant. These results imply that while there is still an effect from agricultural shocks on the household decision to send a child, controlling for the history of shocks that the household experienced is important for accurately measuring this effect. Intuitively, this suggests that households which have a negative shock in a given year might not be very likely to send out a child, but if the household had two or three years of negative shocks, then controlling for this history of shocks is important for understanding their current fostering decision.

In both columns 1 and 3, the network quality variable measured as the number of good matches in the household's network still has a positive effect on the household's decision to send a child, and it is still significant. However, the quality-weighted network size measure is no longer significant. The results for the household demographics variables when the regressions only control for 1 period of lagged shocks or no lagged shocks shows that the results are very robust. Coefficient estimates are similar to those in Table 6 while standard errors are reduced for many of these variables. In this specification, having more girls aged 5 to 15 and boys aged 11 to 15 increases the probability of sending a child in a given year.

All logit regressions in Tables 6 and 7 include village, year, and village-year interaction dummies to capture any factors that are unique to each village in a given year. Possible village heterogeneity might include different local weather patterns affecting agricultural shocks or access to different types of network members due to different migration patterns. Possible time trends might also affect agricultural shocks.

4.4 Further evidence on role of transitory shocks

To test the robustness of these results regarding household level shocks, this subsection provides further evidence that the household sending decision depends on transitory shocks and not on permanent income measures. I discuss several regressions that include different measures of household level wealth and permanent income. The results consistently show that transitory shocks matter

for the sending decision while permanent measures do not. Then I restrict the sample to include only those households that exchanged a foster child, and I analyze the transitory shocks for the senders and the receivers involved in a given fostering exchange. I show that the distribution of senders' shocks first order stochastically dominates the distribution of receivers' shocks, which means that senders are experiencing worse shocks than the receivers. I then compare the wealth for a given sender household with the wealth for the paired receiving household and find that the median difference between sender and receiver wealth is only approximately $8, roughly 4 percent of annual income for these farmers. In 45 percent of the foster cases, the sender household was wealthier than the receiving household. This is further evidence that households are not simply sending their children to other households that are wealthier. There are other attributes about the households that must be relevant for the fostering decision. Finally, using this restricted sample of households that have sent children matched with the paired receiving household, I present a logit regression where I attempt to estimate the probability that a household in the sample is a sender (as opposed to a receiver). Results show that both households' shocks matter for determining which household sends and which household receives.

Table 8 presents logit regressions, similar to those in Table 6, but that also include different measures of the household's wealth. Results for network quality, shocks, and household demographics are robust to including these different wealth measures. The household wealth variable in column 1 is measured as the value of the household's livestock and assets.[15] Column 2 presents a measure of the household's permanent income that is calculated as the three year average of income earned from agricultural and non-agricultural sources. Column 3 presents a linear probability model in which I instrument for the household's wealth using the respondent's parents' characteristics as instruments.[16] Results for the three different household wealth measures indicate that permanent characteristics of the household are not important for the sending decision. None of the coefficients are statistically significant and all are very close to zero.

[Still to discuss:

1. Describe graphs for distribution of shocks for senders versus receivers (presented during development lunch, 2/18/03). More evidence that shocks are what matters for sending decision. It might be convincing if I draw the same graph and measure wealth instead of shocks, and if the graph shows that the distribution of wealth for senders and receivers is not different.

2. Describe income/wealth cross tabulations for receiver minus sender households. This is more evidence that it is not an income or a wealth story.

[15] Assets include 17 different items that rural households might typically own, such as a bicycle, a radio, a wheelbarrow, and a cart. To account for heterogeneity in asset worth across individuals, the value of each asset is reported by the respondent.

[16] The instruments include number of wives for the respondent's father, rank of respondent's mother among father's wives, number of children of respondent's father, number of children of respondent's mother, village level positions held by either the father or mother, and whether respondent was fostered as a child.

3. Run regression of probability of being a sender instead of a receiver as function of own shocks and own demographics, other household's shocks and its demographics, and some measure of whether each person is considered a good match person (maybe include their predicted probability of being selected or the actual characteristics about the person). This will show that own shocks matter for sending decision and other household's shocks matter for receiving decision. More evidence that it is a transitory story.]

5 Conclusion

Given the potential welfare implications of child fostering and its widespread nature in much of Africa, it is an important development policy goal to understand why households are engaged in this activity. This paper develops and then empirically confirms a theoretical model that argues that households send out children for three distinct reasons: risk coping, demographic imbalances, and network quality. I find that households are more likely to send out a child in response to negative transitory shocks, and that parents attempt to offset demographic imbalances in the age and sex composition of their children. Finally, I quantitatively measure the quality of the sending household's network of potential receivers and show that this influences its decision to send a child. The research is based on eighteen months of fieldwork in Burkina Faso that I conducted, and the survey instrument and the research methodology that involved locating both the sending and receiving households involved in each fostering exchange make these data particularly appropriate for testing this theoretical model.

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Table 1: Tabulation by Occupation of the Percentage of Immediate Family Members Who Received a Foster Child

Occupation	Percentage of Immediate Family Members Who Did Not Receive Foster Child	Percentage of Immediate Family Members Who Received Foster Child	Number of Immediate Family Members With Given Relationship to Respondent
Farmer	93.54%	6.46%	1733
Employee, bureaucrat	90.7%	9.3%	86
Business person	89.66%	10.34%	203
Manual labor	91.11%	8.89%	45
Housewife	95.45%	4.55%	154
Other job	90.7%	9.3%	86
Retired, unemployed	97.73%	2.27%	88
Total	93.24%	6.76%	2395

Note: Conditional on immediate family member having a given occupation, table presents the percentage of immediate family members who were selected to receive a foster child. Data source: Author's survey.

Table 2: Tabulation by Relationship with Respondent of the Percentage of Immediate Family Members Who Received a Foster Child

Relationship	Percentage of Immediate Family Members Who Did Not Receive Foster Child	Percentage of Immediate Family Members Who Received Foster Child	Number of Immediate Family Members With Given Relationship to Respondent
Parents	78.93%	21.07%	242
Brother	95.09%	4.91%	917
Sister	96.60%	3.40%	940
Adult Children	88.51%	11.49%	296
Total	93.24%	6.76%	2395

Note: Conditional on immediate family member having a given relationship with the respondent, table presents the percentage of immediate family members who were selected to receive a foster child. Data source: Author's survey.

Table 3: Logit and Fixed Effect Logit Regressions Estimating Probability of Selecting a Given Network Member

Dependent Variable: Network member is selected	(1) Logit Marginal Effects	(2) Child FE Logit Marginal Effects
Employee, bureaucrat	0.031	0.042
	[0.016]**	[0.030]
Business person	0.042	0.070
	[0.011]***	[0.020]***
Manual labor	0.035	0.061
	[0.019]*	[0.040]
Housewife	-0.007	-0.033
	[0.016]	[0.032]
Other job	0.040	0.070
	[0.015]***	[0.030]**
Unemployed, retired	-0.057	-0.091
	[0.030]*	[0.048]*
Parents	0.083	0.122
	[0.012]***	[0.019]***
Sisters	-0.018	-0.026
	[0.011]	[0.017]
Adult Non-coresident Children	0.041	0.076
	[0.010]***	[0.019]***
Recently married	-0.022	-0.038
	[0.013]*	[0.023]
Widowed/Divorced	-0.049	-0.084
	[0.014]***	[0.022]***
Never Married	-0.065	-0.110
	[0.018]***	[0.030]***
Attended school	0.004	0.029
	[0.013]	[0.023]
Has kids in school	-0.004	-0.015
	[0.011]	[0.018]
Network Member Has Boys 0-5	-0.023	-0.044
	[0.013]*	[0.024]*
Network Member Has Boys 6-10	-0.021	-0.031
	[0.013]	[0.023]
Network Member Has Boys 11-15	0.007	0.007
	[0.015]	[0.026]
Network Member Has Girls 0-5	-0.013	-0.024
	[0.013]	[0.022]
Network Member Has Girls 6-10	0.002	0.003
	[0.012]	[0.023]
Network Member Has Girls 11-15	-0.010	-0.014
	[0.019]	[0.029]
Birth in 2000	-0.009	-0.008
	[0.011]	[0.020]
Birth in 1999	-0.005	0.004
	[0.013]	[0.021]

Birth in 1998	0.000	0.002
	[0.012]	[0.021]
Boy Sent age 5-10	-0.022	
	[0.011]**	
Girl Sent age 11-15	-0.018	
	[0.011]	
Boy Sent age 11-15	-0.042	
	[0.015]***	
(Boy Sent 5-10)*(Network Member Has Boys 0-5)	-0.005	0.014
	[0.022]	[0.037]
(Boy Sent 5-10)*(Network Member Has Boys 6-10)	-0.009	-0.033
	[0.020]	[0.040]
(Boy Sent 5-10)*(Network Member Has Boys 11-15)	0.024	0.054
	[0.021]	[0.042]
(Boy Sent 5-10)*(Network Member Has Girls 0-5)	0.023	0.045
	[0.019]	[0.035]
(Boy Sent 5-10)*(Network Member Has Girls 6-10)	0.008	0.015
	[0.022]	[0.038]
(Boy Sent 5-10)*(Network Member Has Girls 11-15)	0.034	0.041
	[0.028]	[0.047]
(Boy Sent 11-15)*(Network Member Has Boys 0-5)	0.005	0.026
	[0.027]	[0.044]
(Boy Sent 11-15)*(Network Member Has Boys 6-10)	0.008	-0.003
	[0.028]	[0.047]
(Boy Sent 11-15)*(Network Member Has Boys 11-15)	0.014	0.011
	[0.030]	[0.049]
(Boy Sent 11-15)*(Network Member Has Girls 0-5)	0.083	0.164
	[0.024]***	[0.047]***
(Boy Sent 11-15)*(Network Member Has Girls 6-10)	-0.024	-0.025
	[0.027]	[0.049]
(Boy Sent 11-15)*(Network Member Has Girls 11-15)	0.009	0.010
	[0.038]	[0.060]
(Girl Sent 11-15)*(Network Member Has Boys 0-5)	-0.012	-0.018
	[0.021]	[0.034]
(Girl Sent 11-15)*(Network Member Has Boys 6-10)	0.029	0.048
	[0.024]	[0.036]
(Girl Sent 11-15)*(Network Member Has Boys 11-15)	0.020	0.056
	[0.024]	[0.040]
(Girl Sent 11-15)*(Network Member Has Girls 0-5)	-0.023	-0.048
	[0.024]	[0.038]
(Girl Sent 11-15)*(Network Member Has Girls 6-10)	-0.021	-0.054
	[0.022]	[0.038]
(Girl Sent 11-15)*(Network Member Has Girls 11-15)	0.040	0.051
	[0.027]	[0.042]
Observations	2395	2395
Log-Likelihood Value:	-504.21	-323.92

Note: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. The omitted categories for the dummy variables included in the regression are as follows: occupation variable is farmer, relationship to respondent variable is brother, marital status variable is married longer than 4 years, child sent variable is girl aged 5-10, age-sex interaction variables are all interactions with girl sent aged 5 to 10. Data source: Author's survey.

Table 4: Tabulation by Network Quality of the Percentage of Households that Sent a Child in a Given Year

Network Quality Count Measure—Number of Good Matches Above 80th Percentile	Percentage of Households that Did Not Send a Child In a Given Year	Percentage of Households that Sent a Child In a Given Year	Number of Household-Year Observations
Household with number of good matches below median value	92.95%	7.05%	567
Household with number of good matches above median value	87.04%	12.96%	864
Total	89.38%	10.62%	1431

Note: Conditional on a household having above or below the median value for the number of good matches in their network, table presents the percentage of households that sent a child in a given year. Data source: Author's survey.

Table 5: Means and Standard Deviations for Household Level Characteristics

Variables	Mean	Standard Deviation
Household Sending	0.110	0.314
Number of good matches above 80th percentile	4.270	2.020
Quality-weighted network size	20.223	5.558
Ad hoc network quality	0.512	0.500
Household shock t	1.580	1.041
Household shock t-1	1.194	1.033
Household shock t-2	1.159	1.067
Number of Boys 0-4	0.557	0.731
Number of Boys 5-10	0.876	0.908
Number of Boys 11-15	0.727	0.931
Number of Boys 16-18	0.181	0.418
Number of Girls 0-4	0.645	0.753
Number of Girls 5-10	0.956	1.050
Number of Girls 11-15	0.641	0.836
Number of Girls 16-18	0.191	0.445
Number of observations	752	

Note: Data source: Author's survey.

Table 6: Marginal Effects from Household Level Logit Regressions Estimating Probability of Sending a Child in a Given Year

Dependent Variable: Household Sending	(1)	(2)	(3)
Number of good matches above 80th percentile	0.018 [0.006]***		
Quality-weighted network size		0.006 [0.003]*	
Ad hoc network quality (Parents/Adult Kids * Businessman)			0.039 [0.023]*
HH shock t	0.025 [0.012]**	0.027 [0.013]**	0.029 [0.013]**
HH shock t-1	0.002 [0.012]	-0.000 [0.013]	-0.003 [0.013]
HH shock t-2	-0.016 [0.012]	-0.016 [0.013]	-0.015 [0.013]
Number of Boys 0-4	-0.014 [0.012]	-0.013 [0.012]	-0.013 [0.013]
Number of Boys 5-10	0.001 [0.011]	0.003 [0.012]	0.007 [0.012]
Number of Boys 11-15	0.010 [0.012]	0.009 [0.018]	0.023 [0.014]*
Number of Boys 16-18	-0.024 [0.021]	-0.025 [0.024]	-0.019 [0.027]
Number of Girls 0-4	-0.017 [0.015]	-0.020 [0.016]	-0.020 [0.016]
Number of Girls 5-10	0.013 [0.010]	0.018 [0.010]*	0.019 [0.010]*
Number of Girls 11-15	0.030 [0.011]***	0.029 [0.012]**	0.039 [0.011]***
Number of Girls 16-18	-0.060 [0.034]*	-0.071 [0.036]**	-0.069 [0.037]*
Observations	368	368	368

Note: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions also include village and year dummies. Data source: Author's survey.

Table 7: Marginal Effects from Household Level Logit Regressions Estimating Probability of Sending a Child in a Given Year

Dependent Variable: Household Sending	(1) Logit Marginal Effects	(2) Logit Marginal Effects	(3) Logit Marginal Effects	(4) Logit Marginal Effects
Number of good matches above 80th percentile	0.013 [0.005]**		0.010 [0.005]**	
Quality-weighted network size		-0.002 [0.003]		0.001 [0.002]
HH shock t	0.018 [0.010]*	0.020 [0.010]*	0.003 [0.007]	0.003 [0.007]
HH shock t-1	-0.013 [0.009]	-0.016 [0.010]		
Number of Boys 0-4	-0.014 [0.012]	-0.012 [0.013]	-0.006 [0.010]	-0.004 [0.010]
Number of Boys 5-10	0.001 [0.010]	0.009 [0.011]	-0.001 [0.008]	0.002 [0.009]
Number of Boys 11-15	0.023 [0.011]**	0.037 [0.014]***	0.020 [0.009]**	0.025 [0.010]**
Number of Boys 16-18	0.003 [0.018]	0.006 [0.020]	0.014 [0.016]	0.014 [0.017]
Number of Girls 0-4	-0.008 [0.012]	-0.010 [0.013]	-0.007 [0.011]	-0.007 [0.011]
Number of Girls 5-10	0.019 [0.008]**	0.026 [0.008]***	0.021 [0.008]***	0.023 [0.008]***
Number of Girls 11-15	0.035 [0.009]***	0.041 [0.010]***	0.028 [0.008]***	0.029 [0.008]***
Number of Girls 16-18	-0.011 [0.021]	-0.017 [0.024]	0.017 [0.015]	0.015 [0.015]
Observations	735	735	1137	1137

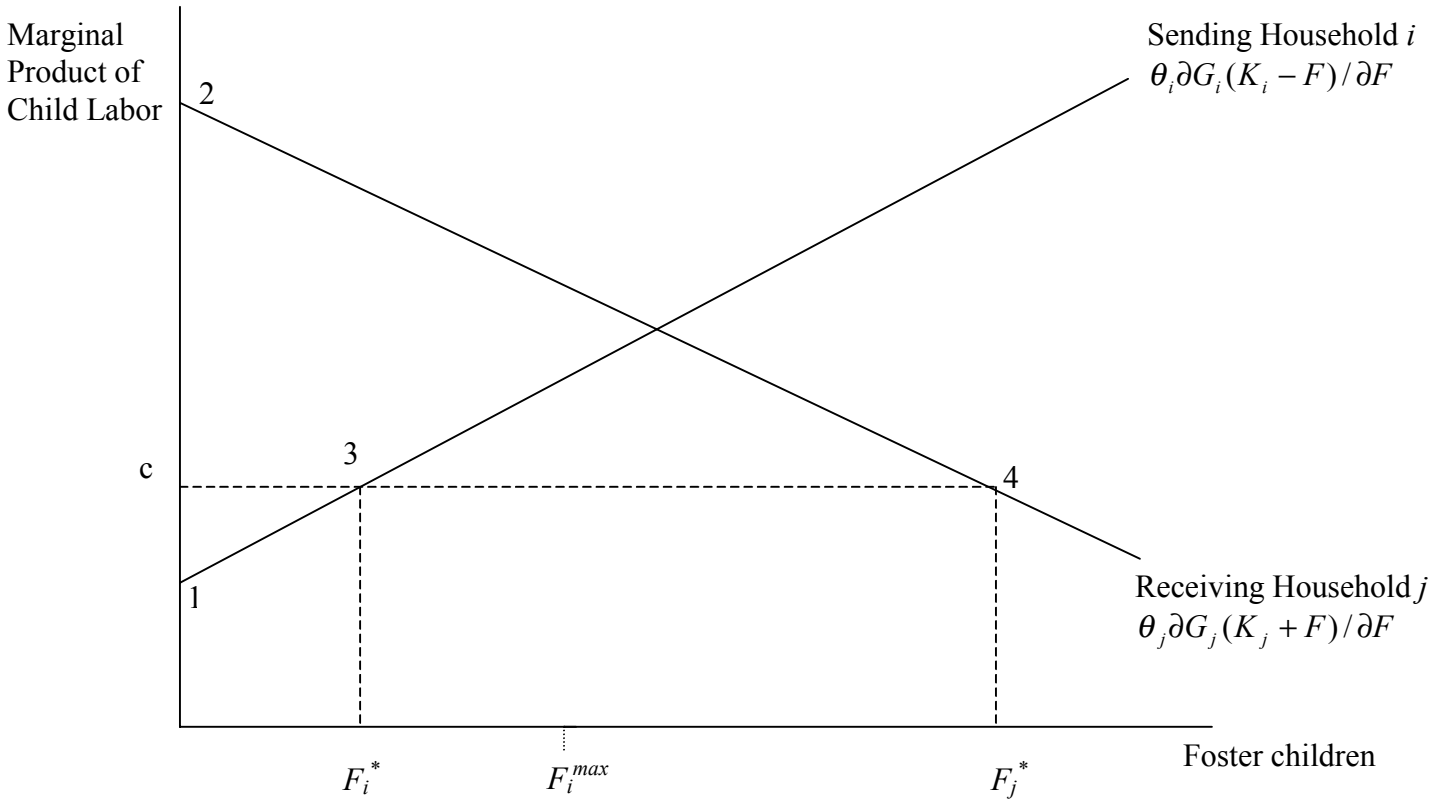
Note: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include village, year, and village-year interaction dummies. Data source: Author's survey.

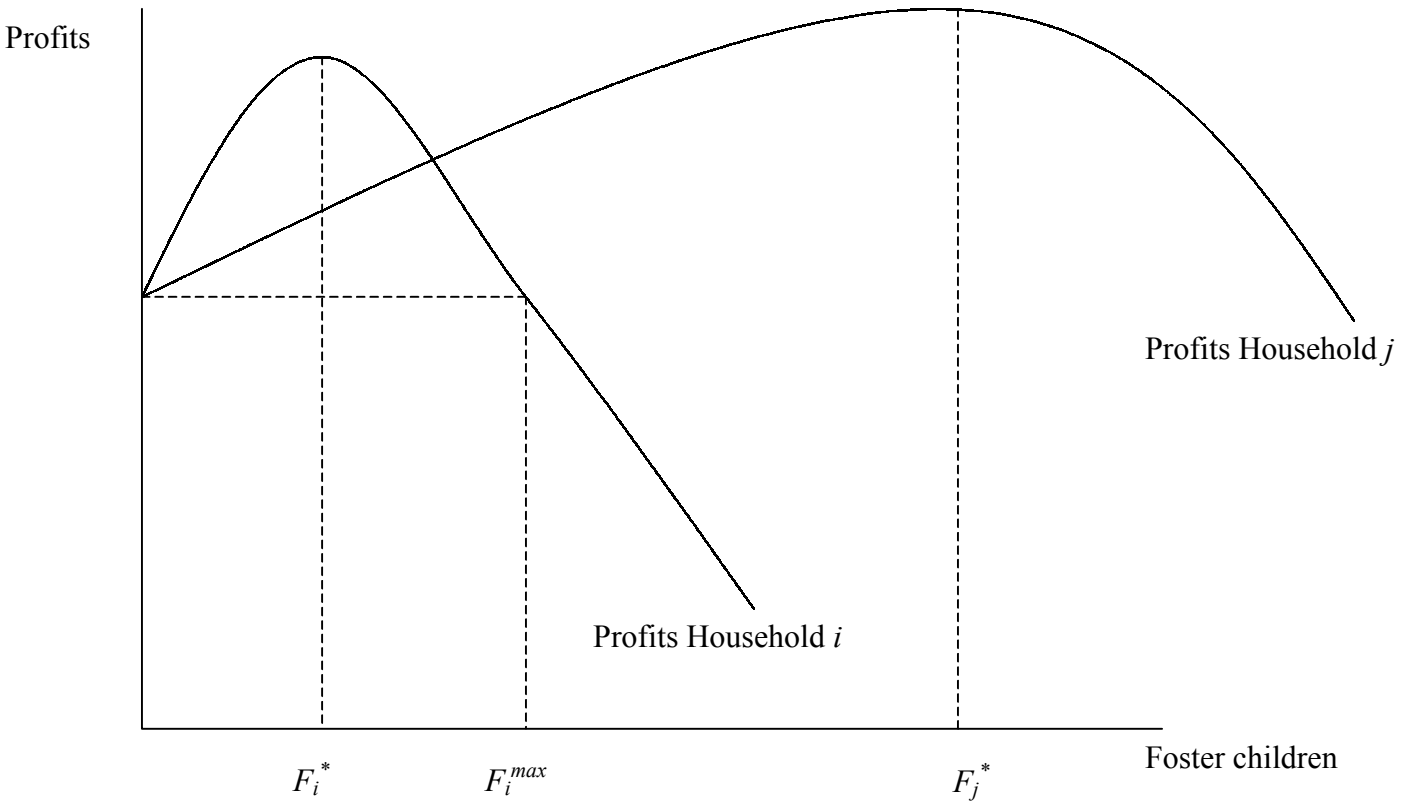
Table 8: Household Level Logit and Linear Probability Model Regressions Estimating Probability of Sending a Child in a Given Year Including Wealth Measures

Dependent Variable: Household Sending	(1) Logit Marginal Effects	(2) Logit Marginal Effects	(3) Linear Probability Model
HH wealth	0.000038		
	[0.000151]		
HH permanent income		0.000359	
		[0.000704]	
Predicted HH wealth using parents' characteristics as instruments			-0.000102
			[0.001023]
Number of good matches above 80th percentile	0.020	0.020	0.029
	[0.006]***	[0.006]***	[0.011]**
HH shock t	0.027	0.027	0.041
	[0.013]**	[0.013]**	[0.022]*
HH shock t-1	0.002	0.003	0.002
	[0.012]	[0.012]	[0.020]
HH shock t-2	-0.015	-0.015	-0.024
	[0.012]	[0.012]	[0.021]
Number of Boys 0-4	-0.012	-0.011	-0.020
	[0.013]	[0.013]	[0.019]
Number of Boys 5-10	-0.002	-0.002	-0.005
	[0.011]	[0.012]	[0.024]
Number of Boys 11-15	0.009	0.009	0.016
	[0.012]	[0.012]	[0.024]
Number of Boys 16-18	-0.025	-0.025	-0.030
	[0.023]	[0.022]	[0.045]
Number of Girls 0-4	-0.012	-0.012	-0.018
	[0.016]	[0.016]	[0.026]
Number of Girls 5-10	0.015	0.015	0.026
	[0.010]	[0.010]	[0.018]
Number of Girls 11-15	0.031	0.031	0.057
	[0.012]**	[0.012]***	[0.029]*
Number of Girls 16-18	-0.062	-0.062	-0.073
	[0.036]*	[0.035]*	[0.034]**

Note: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions also include village and year dummies. In column 3, household wealth is instrumented using parental characteristics of the respondent including number of wives for respondent's father, rank of respondent's mother among father's wives, number of children of respondent's father, number of children of respondent's mother, village level positions held by either the father or mother, and whether respondent was fostered as a child. Data source: Author's survey.

Figure 1: Marginal Benefit and Marginal Cost For Sending Household *i* and Receiving Household *j*





Appendix Table 1: Breakdown of Children Sent and Received by Age at Time of Fostering

Age at Time of Fostering	Number of Children Sent	Number of Children Received	Total Number of Children Sent or Received
0	0	1	1
1	1	1	2
2	0	1	1
3	4	12	16
4	4	10	14
5	2	9	11
6	10	17	27
7	11	15	26
8	19	19	38
9	10	16	26
10	17	25	42
11	11	11	22
12	19	8	27
13	12	11	23
14	23	10	33
15	21	5	26
16	17	3	20
17	10	1	11
Total	191	175	366

Note: Data source: Author's survey.

Appendix Table 2: Means and Standard Deviations for Network Members' Characteristics

Variable	Mean	Standard Deviation
Dependent Variable=Network Member Selected	0.0676	0.2512
Occupation Variables		
Employee, bureaucrat	0.0359	0.1861
Business person	0.0848	0.2786
Manual labor	0.0188	0.1358
Housewife	0.0643	0.2453
Other job	0.0359	0.1861
Retired, unemployed	0.0367	0.1882
Relationship to network member		
Parents	0.1010	0.3014
Sisters	0.3925	0.4884
Adult Kids	0.1236	0.3292
Marital Status		
Recently Married	0.0948	0.2930
Widowed/Divorced	0.1090	0.3117
Never Married	0.0910	0.2877
Education		
Attended school	0.0747	0.2630
Network Member Has Kids in School	0.1570	0.3639
Network Member's HH Demographics		
Network Member Has Boys 0-5	0.3612	0.4804
Network Member Has Boys 6-10	0.3119	0.4634
Network Member Has Boys 11-15	0.1624	0.3689
Network Member Has Girls 0-5	0.3077	0.4616
Network Member Has Girls 6-10	0.2668	0.4424
Network Member Has Girls 11-15	0.1207	0.3258
Birth in 2000	0.2104	0.4077
Birth in 1999	0.1311	0.3376
Birth in 1998	0.1395	0.3465
Characteristics of Child Sent		
Boy Sent age 5-10	0.1891	0.3917
Girl Sent age 11-15	0.2948	0.4560
Boy Sent age 11-15	0.1240	0.3297
Observations	2395	

Data Source: Author's survey. Every variable is a 0, 1 dummy indicating whether the network member possessed that characteristic or not. Means indicate percentage of network members that possess that characteristic.

Appendix Table 3: Marginal Effects from Household Level Ordered Logit Regressions Estimating Probability of Sending a Child in a Given Year

Dependent Variable: HH Sending	(1) Marginal Effect on Probability of Sending 1 Child	(2) Marginal Effect on Probability of Sending 2 Children
Number of good matches above 80th percentile	0.0145 [0.0053]***	0.0018 [0.0009]**
HH shock t	0.0232 [0.0103]**	0.0029 [0.0019]
HH shock t-1	-0.0005 [0.0106]	0.0001 [0.0013]
HH shock t-2	-0.0125 [0.0102]	-0.0016 [0.0013]
Number of Boys 0-4	-0.0122 [0.0108]	-0.0015 [0.0015]
Number of Boys 5-10	0.0004 [0.0097]	0.0000 [0.0012]
Number of Boys 11-15	0.0107 [0.0119]	0.0014 [0.0017]
Number of Boys 16-18	-0.0245 [0.0162]	-0.0031 [0.0026]
Number of Girls 0-4	-0.0141 [0.0129]	-0.0018 [0.0018]
Number of Girls 5-10	0.0123 [0.0088]	0.0015 [0.0014]
Number of Girls 11-15	0.0295 [0.0104]***	0.0037 [0.0020]*
Number of Girls 16-18	-0.0538 [0.0327]*	-0.0068 [0.0044]
Observations	368	368

Note: Robust standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions also include village dummies and year dummies. Data source: Author's survey.