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Economic Aspects of Child Fostering in Côte d'Ivoire

Martha Ainsworth

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Economic Aspects of Child Fostering in Côte d'Ivoire

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Economic Aspects of Child Fostering in Côte d'Ivoire

Martha Ainsworth

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ABSTRACT

Throughout West Africa, it is a common and socially accepted practice for parents to send their children to live with other households. Several economic motives have been suggested for these "fostering" arrangements: the demand for child labor; investments in human capital; child care; and income insurance. Child fostering, like fertility, is a measure of the demand for children. Evidence of economic factors underlying fostering decisions would demonstrate that the demand for children in Africa is potentially susceptible to policy intervention.

This paper examines the economic determinants of child fostering decisions in Cote d'Ivoire, where, in 1985, one fifth of non-orphaned children age 7-14 were living away from both natural parents. The economic determinants of both sending and receiving decisions are examined separately and evaluated with respect to their support for child labor and human capital explanations. The determinants for both sides of the fostering market are then estimated simultaneously, using a model of friction developed by Rosett (1959), so that the symmetry of fostering determinants can be formally tested.

The results indicate that important economic factors affect fostering decisions on both sides of the fostering market; however, different factors explain sending and receiving decisions. The economic determinants also vary by the sex of the child and whether the household is in an urban or rural area. The findings are consistent with a child labor explanation and inconclusive with respect to schooling investments as a motive. Although the number of children fostered out increases with family size, the paper finds no evidence that children are fostered out because parents cannot afford them. The symmetry of fostering decisions could not be rejected; nevertheless, in all regressions the significant determinants of the sending and receiving decisions are different.

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FOREWORD

Population is growing more rapidly in Sub-Saharan Africa than in any other developing region, the result of continued high fertility and substantial mortality decline since the second World War. Although many African couples would have fewer children with better access to family planning methods, most analysts agree that the "demand" for children -- as reflected in actual fertility and statements about desired family size -- remains high over much of the continent.

This paper analyzes the economic factors underlying the widespread practice of child fostering in Côte d'Ivoire -- a practice often subjected to sociological analysis but not previously analyzed by economists. The paper provides convincing evidence that: (a) child fostering can be partly explained by the demand for child labor; and (b) the economic benefits of children remain strong in Côte d'Ivoire, and must be taken into consideration in any strategy to reduce fertility and rapid population growth.

This paper is part of a broader program of research in the Population and Human Resources (PHR) Department on the extent of poverty in developing countries and on policies to reduce poverty. This research program is located in the Poverty Analysis and Policy Division. Martha Ainsworth is a human resources economist in the Africa Technical Department who worked extensively in the design of the Living Standards Measurement Study (LSMS) survey methodology. This paper, which uses LSMS data from Côte d'Ivoire, is an extract from her doctoral dissertation. The extensive linking between individuals within households and between households and extended families in the LSMS surveys is quite a rarity among household surveys. This linking makes the LSMS data sets a rare and valuable source of information for empirical analysis of child fostering.

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1. INTRODUCTION

Throughout West Africa, it is a common and socially accepted practice for parents to send their children to live with other households. Anthropological studies in Côte d'Ivoire, Ghana, and Sierra Leone have described these "fostering" arrangements (Antoine and Guillaume, 1986; Bledsoe, 1989; Bledsoe and Isiugo-Abanihe, 1989; Brydon, 1979, 1985; Etienne, 1979a, 1979b; Fiawoo, 1978; Goody, 1982; Issac and Conrad, 1982; Saint-Vil, 1981; Schildkrout, 1973). In certain instances, fostering arises out of family *crises*, such as the death of one or both parents, parental separation, illegitimacy, or infertility of a relative. In these instances, parental obligations may be *permanently* transferred to the foster parents, much like an adoption. Far more prevalent, however, is the practice of *voluntarily* sending children on a *temporary* basis to live in another household; the foster child retains all obligations to his or her natural parents and remains a member of the parents' lineage. A child may be fostered for short or long periods, more than once, and to different households. Children of all ages are fostered and most are sent to the households of relatives. In some African societies fosterage has been practiced traditionally, while in others it is a more recent phenomenon arising from economic development.

This paper analyzes the economic determinants of child fostering in Côte d'Ivoire, where, in 1985, one fifth of non-orphaned children age 7-14 were living away from both parents. Fostering, like fertility, is a measure of the demand for children. While fertility decisions are irreversible (short of infanticide or abortion), fostering is a temporary and reversible way of adjusting family size post-natally. If couples make fertility decisions based on the costs and benefits of children, the price of children relative to other investment and consumption goods, and a budget constraint, then a similar calculation should apply to fostering decisions. Evidence of economic determinants of fostering would demonstrate that the demand for children in Africa is potentially susceptible to policy intervention.[1]

Several economic motives for child fostering have been suggested: child labor; investment in human capital; child care; and insurance.[2]

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[1] Fostering also has demographic implications (Isiugo-Abanihe, 1985; Page, 1986). Households with low fertility may have large family size due to the presence of foster children. Fostering spreads the costs of childbearing over the extended family, minimizing the costs of bearing children to the parents. It has been argued that fostering is an institution for "managing" high fertility in Africa and that it divorces child costs from fertility decisions (Isiugo-Abanihe, 1983, 1985; Bledsoe, 1989; Bledsoe and Isiugo-Abanihe, 1989; Frank, 1984; Oppong and Bleek, 1982). Parental characteristics may have little effect on the nutrition, morbidity, or mortality outcomes for children, if children are living away from their parents; the relevant variable might be characteristics of the receiving household. Finally, widespread fostering means that there is substantial migration of children in West Africa, independent of migration of parents.

[2] The predominance of fostering to the households of relatives can be explained in terms of minimizing transactions costs for both the sending and receiving households, ensuring that the child will not be mistreated, and minimizing supervision costs of the receiving household (Ben-Porath, 1986; Pollack, 1985).

* *The Demand for Child Labor.* The role of foster children in home production is often cited as a motivation for receiving older foster children, particularly girls (Antoine and Guillaume, 1986; Bledsoe and Isiugo-Abanihe, 1989; Etienne, 1979b; Fiawoo, 1978; Goody, 1982; Issac and Conrad, 1982; Oppong and Bleek, 1982; Schildkrout, 1973).[3] Foster children help out with chores in the host household in return for all or part of their upkeep, including school expenses. Foster girls perform domestic work, substituting for the time inputs of working mothers and of the host household's own children who may be enrolled in school. A life-cycle pattern of fostering for child labor has also been suggested; children may be fostered out of households with a temporary surplus of child labor at mid-life and into households with child labor deficits at either extreme of the life cycle (Frank, 1984; Isiugo-Abanihe, 1985; Page, 1986).

* *Investments in Human Capital.* Children are often fostered out to learn a trade or to attend school (Brydon, 1979; Chernichovsky, 1985b; Goody, 1982; Gould, 1985; Saint-Vil, 1981). School-related fostering is prevalent among children of secondary-school age, since middle and secondary schools are often located in urban areas. It may also occur at the primary level if local primary schools are inaccessible, crowded, or of poor quality.[4] The costs of schooling and upkeep may be paid entirely by the sending household, entirely by the host household, or shared (Goody, 1982; Brydon, 1979; Schildkrout, 1973). Other types of child investments associated with fostering are apprenticeships and "alliance" fostering, in which a child is fostered to a household of higher social standing in hope of eventual social advancement (Goody, 1982).

* *Child Care.* There is a growing tendency for urban working mothers to foster out their young children (under 6) to grandmothers and other relatives in rural areas for child care (Bledsoe and Isiugo-Abanihe, 1989; Brydon, 1979; Fiawoo, 1978). Children can be raised more cheaply in villages and their urban mothers can continue working. These arrangements generally involve some type of compensation to the caretaker in the host household.[5]

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[3] The value of child labor in home production is thought to be an important reason for the high demand for children in many parts of the developing world (Chernichovsky, 1985; Levy, 1985; Rosenzweig and Evenson, 1977). Numerous studies have documented the contribution of children to home production (Cain, 1977; Mueller, 1976,1985; White, 1975). Children as young as 7 years of age fetch drinking water and firewood, shop, clean, mind younger siblings, and tend livestock, freeing older children and adults to engage in more productive activities. Beginning at age 11-13, children often participate directly in agricultural production. DaVanzo (1972), Levy (1985), and Rosenweig and Evenson (1977) found positive relationships between the child wage, child labor force participation, and fertility in developing countries.

[4] Gould (1985) notes that in East Africa children do not necessarily attend the nearest school; they try to enroll in the schools with the best pass rate. Antoine and Guillaume (1986) note that parents in Abidjan often send their children to schools in the interior because they are more "developed."

[5] In Sierra Leone, grandmothers actually compete for the care of their infant grandchildren to insure a flow of resources from the parents. "Parents know that one of the main reasons why grannies lobby for children is that they will soon begin asking the children's parents for things they would ask for anyway--food, clothes, and money--but would ordinarily have little leverage to demand" (Bledsoe and Isiugo-Abanihe, 1989, p.21).

* *Income Insurance.* Bledsoe and Gage (1987), Bledsoe and Isiugo-Abanihe (1989), and Frank (1984) have suggested that foster children are received to augment their foster parents' potential sources of support in old age.[6] Fostering may also enforce implicit insurance contracts between urban and rural households: rural farm households may accept an urban child to have a claim on resources from the sending household in bad times, while urban households may accept a rural child to obtain transfers from farm households in times of high unemployment (Bledsoe and Isiugo-Abanihe, 1989; Brydon, 1979; Etienne, 1979b; J. Goody, 1987). Finally, fostering may represent an *ex post* attempt to smooth consumption for remaining household members in response to exogenous income shocks.

This paper examines the economic determinants of fostering children age 7-14 using data from the 1985 Côte d'Ivoire Living Standards Survey (CILSS), a national sample of 1599 African households.[7] Foster children are defined as non-orphaned children living away from *both* biological parents. The paper will focus on evidence that fostering is due to demand for child labor and, to a more limited extent, to schooling investments. Insurance explanations cannot be explored with this data set. The next section describes the prevalence of fostering in Côte d'Ivoire, the characteristics of households that participate in fostering arrangements, and the activities of foster children compared to those not fostered. In Section 3 a short-run model of household demand and supply of child labor is posited in which the stock of children is adjusted in response to short-run child labor needs by fostering them into or out of the household. This model motivates a reduced form equation of the determinants of the number of children fostered on both sides of the fostering "market", which is estimated empirically in section 4. In Section 5 the two sides of the fostering market are estimated jointly using a model of friction, and the "symmetry" of fostering decisions is formally tested. The final section summarizes the results.

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[6] Whether foster parents actually receive extra compensation later in life has not been shown. Since most children are fostered to relatives, it would have to be shown that the income flows from foster children exceed the flows that foster parents would have received anyway by virtue of being related (Schildkrout, 1973).

[7] The survey is documented in Ainsworth and Muñoz (1986) and Grootaert (1986).

2. ECONOMIC CORRELATES OF CHILD FOSTERING

A foster child can be defined in terms of the absence of the mother, the father, or both parents. To focus on the economic reasons for fostering, a foster child is defined as a child who is living away from *both* parents, at least one of whom is alive. Orphans who have lost both parents and children living with one parent are not considered foster children and will be classified as belonging to the household in which they reside. The paper will concentrate on fostering of children age 7-14, since these children are old enough to contribute to home production but too young to be forming households of their own. Households that have sent a child away to be fostered will be referred to as sending households; those that have accepted a foster child are receiving, or host households.

Prevalence of Fostering in Côte d'Ivoire

Among the 3110 children age 7-14 residing in CILSS households, 20.2 percent were living away from both parents. The percent of children fostered increases with age, from about 1 percent of infants to one-quarter of 14 year olds (see Figure 1). Ninety-three percent of foster children were related to the head of the host household or his/her spouse. A significantly higher proportion of girls 7-14 was fostered than boys (22.4 vs. 18.0 percent, respectively). If schooling investments were a major reason for fostering children, greater fostering of boys might be expected: the 1984 gross primary enrollment ratio for boys in Côte d'Ivoire was 91 percent, compared to only 63 percent for girls (World Bank, 1987). Marriage does not account for the higher fostering of girls: all 11 cases of ever-married children under the age of 15 have been dropped from the analysis.

Overall, 24.3 percent of households had a foster child 7-14 living with them and 18.6 percent had fostered a child out. The imbalance between the proportion of households fostering in and out is most likely due to an undercount of children fostered out.[8] Included in these percentages are 52 households (3.3 percent) that sent and received foster children simultaneously; these cases generally involved fostering in and out children of different ages and sexes. Sixty percent of households had neither sent nor received foster children age 7-14. Rural households were the most likely to foster out children, while urban households were the most likely to foster them in. In fact, farm households were more likely to foster out a child and were less likely to foster in a child than were non-farm households: 21.4 percent of farm households fostered out a child 7-14 compared to only 13.1 percent of non-farm household. For fostering in, the figures are 22.5 and 27.9

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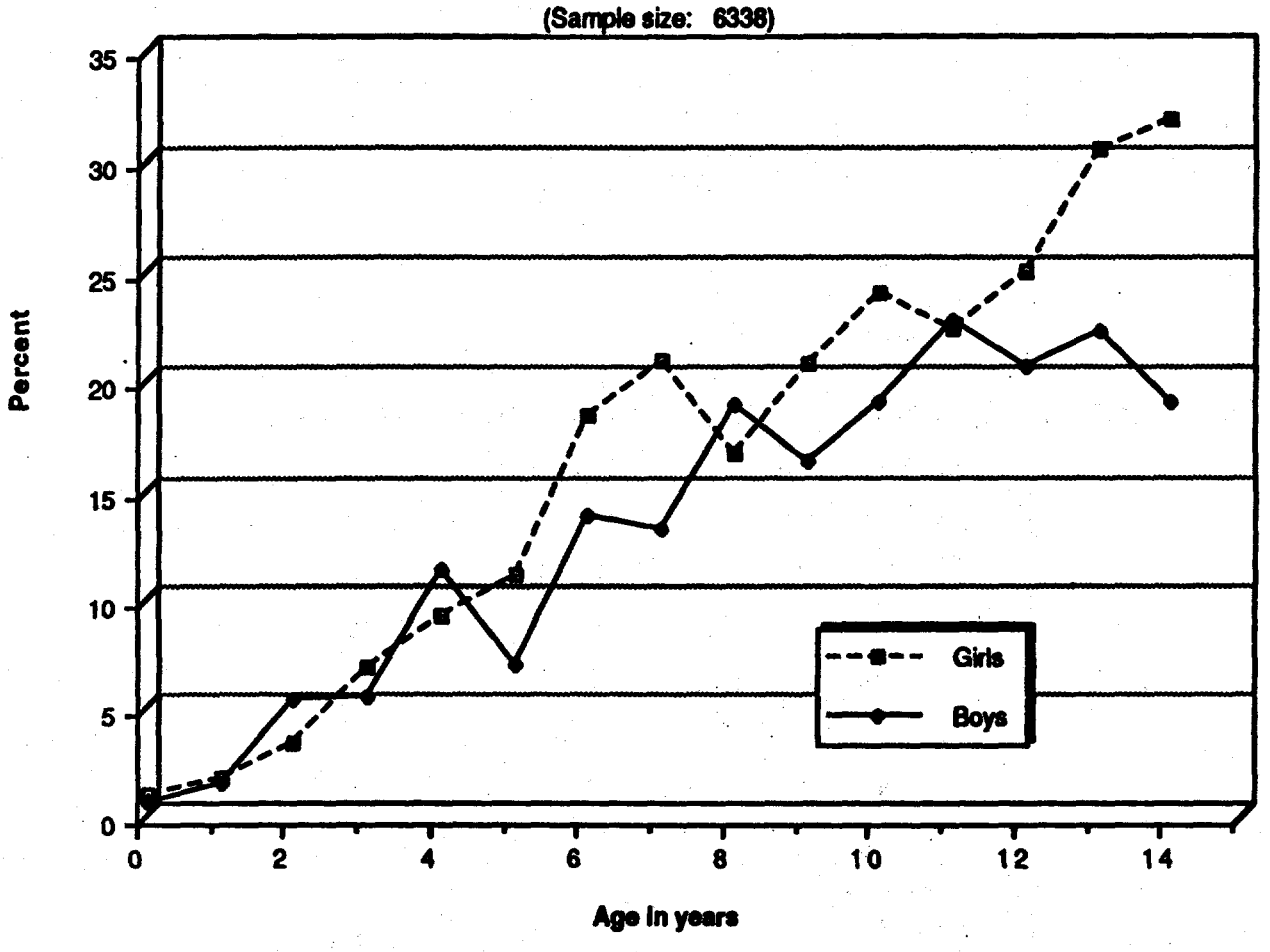
[8] The number of children fostered out was obtained from a list of non-resident children of household members. In keeping with the definition of a foster child as one living away from both parents, for a nonresident child to be considered fostered out, both of his/her parents had to be residing in the household. This definition automatically leads to under-reporting of children fostered out, since a child could have been sent away from one parent and be living with someone other than the second parent. The discrepancy between household fostering in and out is not due to net fostering across international boundaries.

FIGURE 1. Percent of children living away from parents, by age and sex of child



percent of farm and non-farm households, respectively. This suggests that the demand for farm labor is not the driving force behind fostering. There are no meaningful differentials in fostering between households with and without a family business.

Economic activities of own and foster children compared

The main economic activities of the children 7-14 were farming and housework. In the seven days preceding the survey, 60 percent of all children performed housework, which includes cleaning, meal preparation, shopping, laundry, and fetching of firewood and drinking water. Among children living in households with a family farm, 23 percent did farmwork. Among children living in households with a family business, 2.5 percent worked in a business belonging to the household. Only 29 children (0.9 percent) had ever been apprentices, and 20 children (0.6 percent) had been or were going to be paid for the work they performed the 7 days before the survey.

Figures 2 and 3 compare the activities of foster children and the resident own children in host households. Foster children of both sexes are more likely to have farmed or performed housework in the past 7 days than are resident own children. Fostered girls have the highest participation rate in housework, but the differential between the participation rates in housework of foster and own boys is even greater than that for girls. Girls seem to specialize in domestic tasks, although their participation rates in farming are not much different than those of boys. The difference in housework participation rates between fosters and own children persists across all three major locations -- Abidjan (the largest city, with one fifth of the population), other urban areas (with one-fifth of the population), and rural areas (with three-fifths of the population). The differential for housework is greatest in Abidjan, however: 59 percent of foster children performed housework compared to only 26 percent of resident own children. The greater role for foster children in housework in urban areas is consistent with the hypothesis that children are fostered in to substitute for the time in home production of working adults or own children attending school. In rural areas, foster children are also more likely to work on the host household's farm than are own children.

Schooling of own and foster children compared

Sixty-three percent of the children 7-14 were enrolled in school in the past 12 months. Because of late enrollment and high repeater rates, almost all enrolled children (97 percent) were in primary school. Foster children of both sexes have substantially lower enrollment rates than the host household's own resident children (see Figure 4). The difference in enrollment rates between fosters and own children is particularly great for girls and, not surprisingly, in urban areas (including Abidjan), where many girls are fostered. Note that the enrollment rate for foster children in urban areas is similar to that of own children in rural areas and 9 percentage points greater than fosters in rural areas.

FIGURE 2A: Percent of girls who worked in the last 7 days

Own and foster children in the same households compared

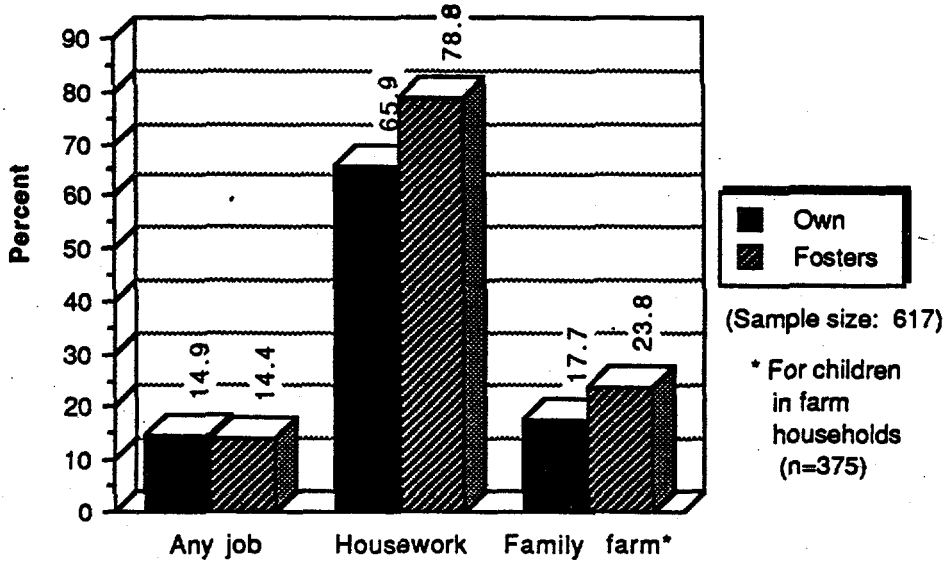


FIGURE 2B: Percent of boys who worked in the last 7 days

Own and foster children in the same households compared

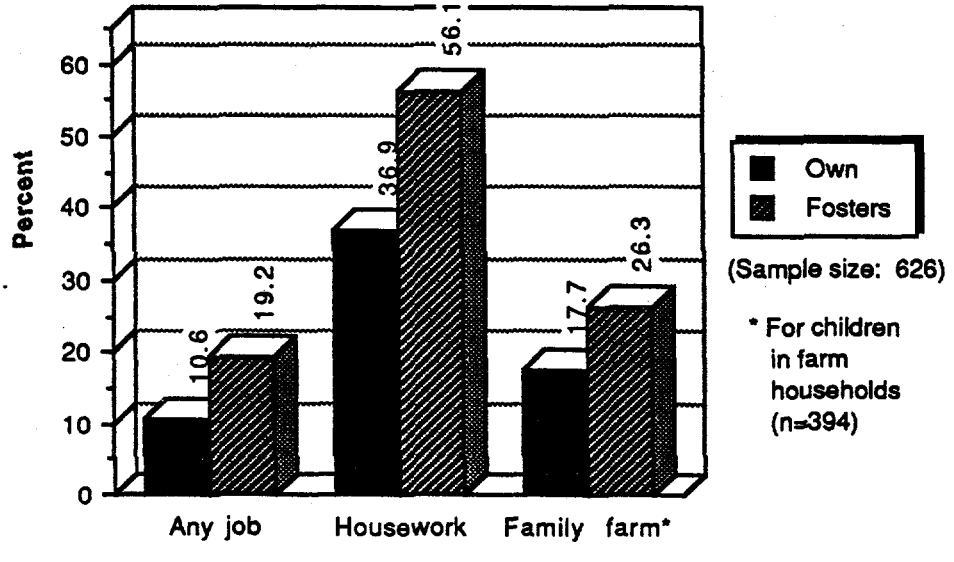


FIGURE 3A: Percent of children in Abidjan who worked in the last 7 days

Own and foster children in the same households compared

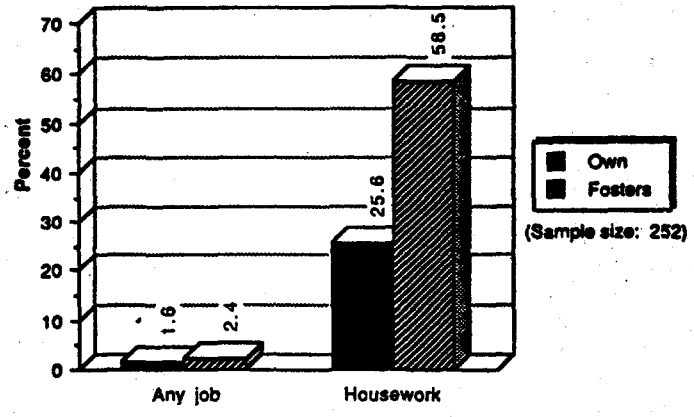


FIGURE 3B: Percent of children in urban areas who worked in the last 7 days

Own and foster children in the same households compared

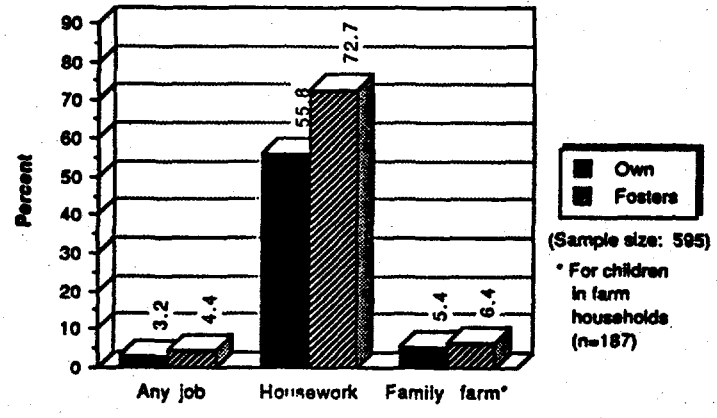
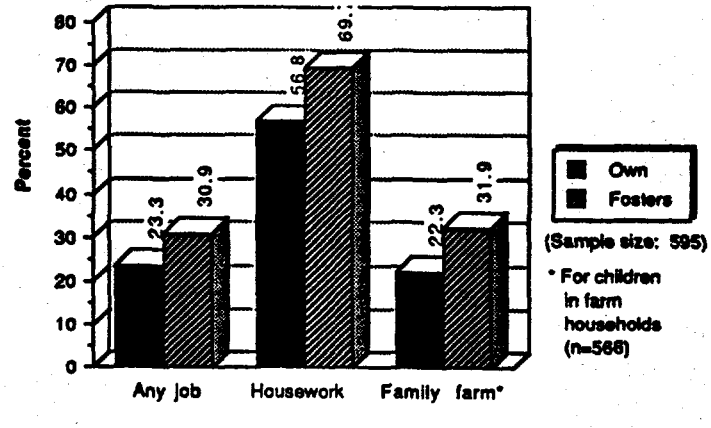


FIGURE 3C: Percent of children in rural areas who worked in the last 7 days

Own and foster children in the same households compared



The enrollment of children 7-14 fostered out and of their siblings of the same age who remained at home is compared in Figure 5. Children fostered out had a *lower* enrollment rate (48.4 percent) than their siblings who remained at home (58.4 percent). When the sample of children is broken down by sex, foster boys and their brothers have almost the same enrollment rates, while foster girls have a lower rate then their sisters who were not fostered. Children fostered from urban areas have similar enrollment rates to their siblings, while foster children from rural areas are considerably less likely to enroll than their siblings.[9]

The fact that foster children get the least schooling does not necessarily contradict the hypothesis that they are fostered to obtain schooling to which they otherwise would not have had access. There are several reasons to believe that school-related fostering is minimal for the group of children analyzed here, however. Most children 7-14 are of primary school age. Among the 57 rural communities surveyed, all but 9 had their own village primary school, and the most distant school was 8 km away. Further, by the definition of household membership--persons residing 3 months or more with the household--children away at school for 9 months of the year would still be classified as members of their parents' household and not fostered. Some school-related fostering at the primary level may nonetheless occur to offset the direct costs of schooling or to obtain better quality instruction. Fostering might also be necessary to attend secondary school.

The vast majority of foster children enrolled in school (91 percent) received funding for school expenses from the host household.[10] Foster children were about four times more likely than own children to receive financial help for schooling from persons outside the household, however--39.7 percent of fosters, compared with 9.9 percent of own children--and foster children in rural areas were more likely to get outside financial help for schooling and less likely to be financed by the host household than were foster children in urban areas. This suggests that fostering into rural areas and to some extent towns may be motivated by schooling, while in Abidjan outlays for the schooling of foster children may represent a form of compensation to the children's parents for the contributions of foster children to housework. Host households made substantial outlays for the schooling of foster children ($59 annually per enrolled foster child) even though more was spent annually on the schooling of their own children ($82). Host households spent about the same amount annually on the schooling of their daughters and of foster girls receiving no outside support ($67 and $64, respectively), while they spent far more on their sons ($91) than on foster boys receiving no outside support ($54). Foster girls enrolled in school received more support from host households than did foster boys.

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[9] A higher proportion of enrolled fosters are in secondary school (12.3 percent) than are their enrolled siblings (2.2 percent), however.

[10] Virtually all own children (98 percent) received funding of school expenses from the host household.

FIGURE 4. **Percent of children enrolled in the last 12 months**

Own and foster children in the same households compared

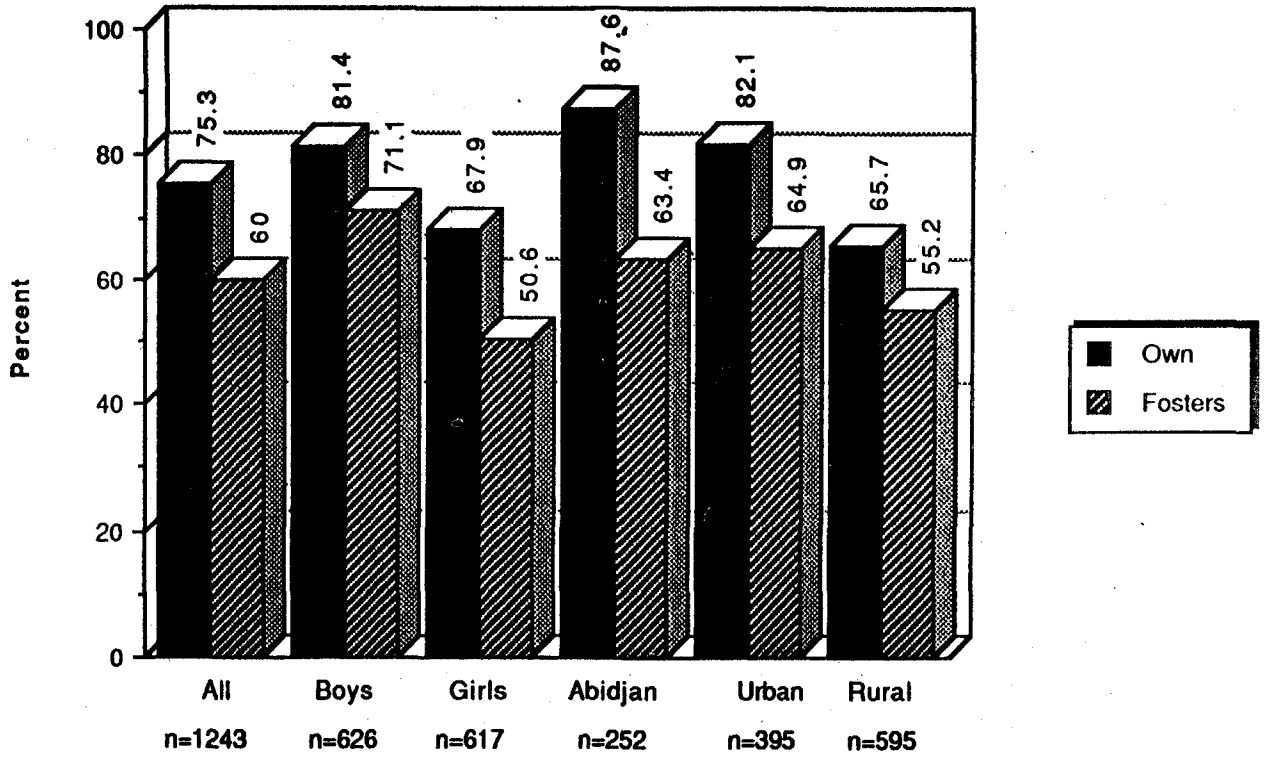
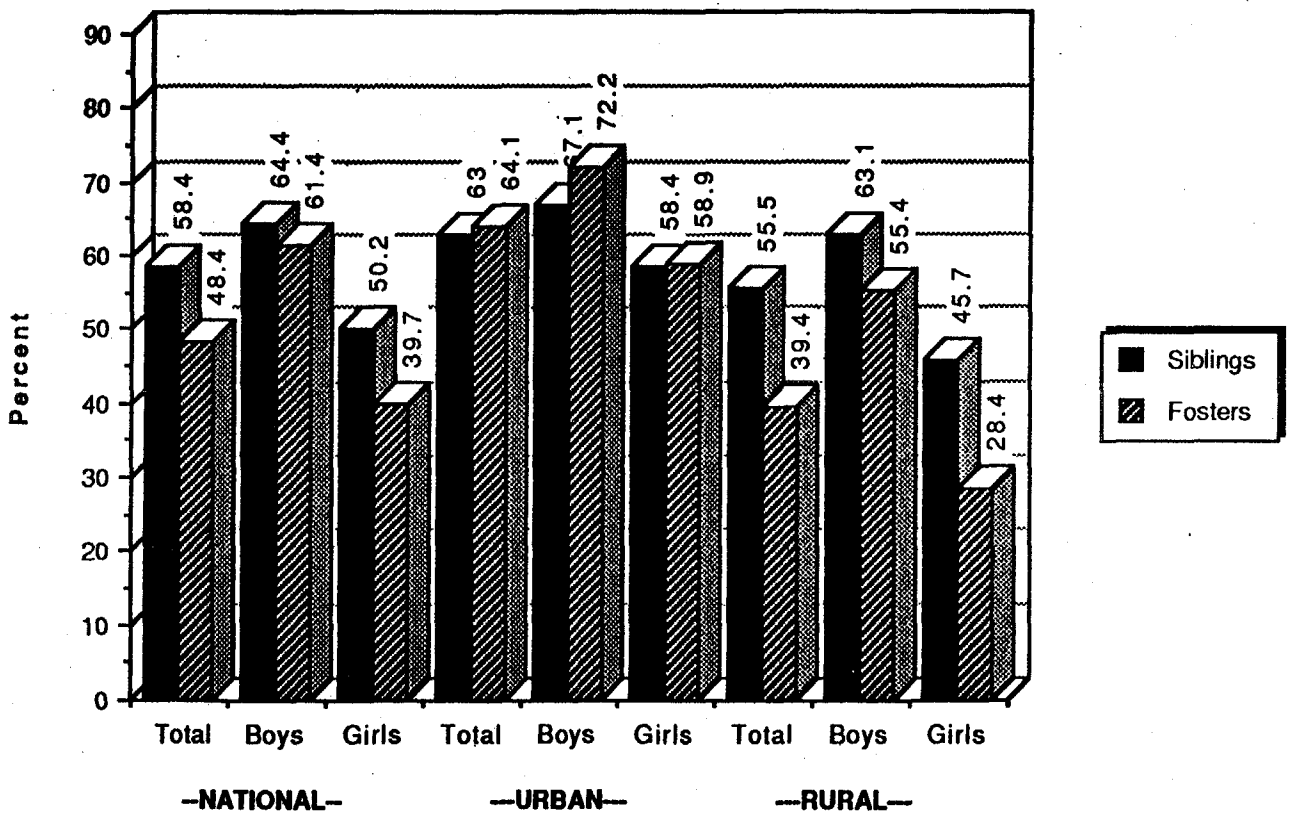


FIGURE 5. **Enrollment of Foster Children 7-14 and their Siblings**

Percent of children currently enrolled



3. A MODEL OF THE DETERMINANTS OF CHILD FOSTERING

The choice of variables for the reduced form equations of the determinants of child fostering is guided by a short-run household production model in which children are a variable input into production of a non-marketed home-produced good.[11] Consider a household in which men specialize in market production, women engage in market and home production, and children specialize in home production. Home production is consumed solely by the household and there is no joint production. In the short run, adult household members maximize their utility over market goods (M), home goods (H), and women's leisure (L), given the number of their own children (C) and the number of adults in the household (A):

$$U = U(M, H, L; C, A), \quad U_i' > 0, \; U_i'' < 0 \tag{3.1}$$

where U_i' and U_i'' are the first and second partial derivatives of the utility function with respect to argument i (i = M,H,L). Adult household composition is assumed fixed and, to focus on interactions between women and children in home production, the labor supply of adult males in the household is also assumed fixed.[12] Adult household members derive utility from their children, but in the time-frame over which fostering decisions are made, the number of surviving own children, C, is given by past fertility and child mortality.[13] The utility that parents receive from their children does not depend on the children's physical presence in the household.[14]

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[11] This model is an adaptation of Gronau's (1973) model of the intrafamily allocation of time in home production between husbands and wives. Rosenzweig (1977) and Rosenzweig and Evenson (1977) incorporated child time in home production into models of fertility. In the Reosenzweig (1977) model, the contribution of mature children to farm production is included in a multiperiod household model of fertility that is tested on a US farm population. Rosenzweig and Evenson (1977) estimated a household model of fertility and child schooling in which the pecuniary returns from child labor are explicitly taken into account. Strauss (1986) presents the general recursive agricultural household model, for which these are all special cases.

[12] This model assumes that child household composition adjusts in the short run but that adult household composition does not. It may be less costly for households to adjust the number of children than to add and subtract adults. Children bring fewer complementary inputs into the household than do adults. Adjustment in adult composition (via marriage, divorce, or production arrangements with relatives) affects non-human assets available to the household--breaking up or consolidating farms, renting or building new housing, and so forth. Further, adults are more likely than children to have accumulated human capital that is specific to productive activities of the household.

[13] Fertility is considered exogenous to fostering decisions in this model. While both fertility and fostering reflect the demand for children, fostering is a temporary decision with a much shorter time frame than fertility, a life-cycle decision. The number of children fostered, conditional on fertility, can adjust upward or downward quickly, while cumulative fertility cannot be adjusted downward once a child is born. For the group of children analyzed here, fertility decisions preceded current fostering decisions by 7-14 years and the number of own 7-14 year olds cannot be adjusted upward. The exogeneity of fertility to fostering is perhaps more difficult to maintain for the fostering of infants.

[14] If parents do get utility from the presence of their own children, this would introduce an additional cost to fostering out that does not occur on the fostering in side--a source of asymmetry in fostering decisions.

The production of home goods is described by a linear homogeneous production function with market goods (X), women's time (T_{Hw}), and child time (N) as inputs:[15]

$$(3.2) \qquad H = f(X, T_{Hw}, N), \quad f_i' > 0, \; f_i'' < 0, \quad i = X, T_{Hw}, N.$$

The number of children used in home production in the short run, N, may be less than, equal to, or greater than the number of children belonging to household members. Own children and foster children are assumed to be substitutes in home production.[16] An exogenous market wage for children is not observed:[17] it is assumed that additional child labor can be obtained only by bringing children to live in the household, and by feeding and clothing them at a cost per child of P_c. It is also assumed that children devote all of their time to home production.[18]

Under the assumptions of constant returns to scale and nonjoint production, the marginal cost π of producing a unit of home goods defines an implicit commodity price of home goods that is independent of the household's consumption bundle (Deaton and Muellbauer, 1980; Pollak and Wachter, 1975; Singh *et al.*, 1986):[19]

$$(3.3) \qquad \pi = \gamma_x P_x + \gamma_w w_w + \gamma_c P_c,$$

where P_x is the price of market inputs, w_w is the woman's market wage, and γ_x, γ_w, and γ_c are input coefficients that are invariant with respect to the amount of H produced. Input demands are proportional to the level of home goods produced, but the price of home goods is not influenced by the production level.

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[15] Girls' and boys' labor might be entered separately to allow for imperfect substitutability of children by sex in home production. One might also include some factor, such as land or productive assets, that is fixed in the short run.

[16] The predominance of kin fostering should make foster and own children close substitutes, as it minimizes transactions costs for both the sending and receiving households. One could also argue that household chores require little or no household-specific human capital (in contrast to Rosenzweig's (1977) model in which farm-specific human capital makes own children and hired labor imperfect substitutes). Imperfect substitutability between foster and own children in home production is an additional potential source of asymmetry in sending and receiving decisions.

[17] The assumption that a market wage for children is not observed is not meant to imply that the market for child labor does not exist. Children may be working for payment in kind, a plausible explanation if their primary contribution is to non-marketed production and if credit markets are imperfect. Mutual exchanges of labor are also common in rural areas, and were reported in 70 percent of the 57 villages in the survey used here.

[18] When children are allowed to work less than full time, the marginal price of child time and commodity prices become endogenous and depend on demand. Pollak and Wachter (1975) compare the situation when commodity prices depend on demand to that of a monopsonistic consumer, in which case there are "virtually no substantive results" that can be predicted.

[19] When assumptions of constant returns to scale technology and nonjoint production are relaxed, implicit commodity prices depend on the amount of home goods produced and thus tastes (Singh *et al.*, 1986). The budget constraint is no longer linear.

The woman's total time (T_0) is allocated among market production (T_m), production of home goods (T_{Hw}), and leisure (L) :

$$T_0 = T_m + T_{Hw} + L \ . \tag{3.4}$$

The full-income budget constraint sets the value of consumption "expenditure" equal to the value of the woman's time endowment and non-labor income:

$$\pi H + P_m M + w_w L = w_w T_0 + V \ , \tag{3.5}$$

where P_m is the price of market goods and V is non-labor income. If it is assumed that male household members spend all available time in market production, then their income can be included in non-labor income.

Maximizing equation (3.1) subject to constraint (3.5), given production relations, yields four first order conditions, three of which equate the marginal utility of each consumption good to the product of its price and the marginal utility of income, and the fourth of which is the budget constraint. The system can be solved for reduced form equations expressing the demand for market goods, home goods, and leisure as functions of commodity prices, female wages, input prices, child costs, and unearned income, given the number of own children and the number of adults in the household:

$$Z = Z\,(P_m, w_w, P_x, P_c, V; C, A) \ , \quad Z = M, H, L \ . \tag{3.6}$$

Input demands depend linearly on H and, given H, on exogenous technology and market prices. The reduced form input demands have as arguments exogenous input and commodity prices, women's wages, child costs, and unearned income:

$$J = J\,(P_m, w_w, P_x, P_c, V; C, A) \ , \quad J = X \ , T_{Hw} \ , N \ . \tag{3.7}$$

The equation of key interest here is the reduced form equation for the demand for child labor. The signs of the coefficients are implied by theory, given some additional assumptions. If home goods are assumed normal, the impact of an increase in exogenous income on the demand for child labor is positive. The effect of an increase in child costs on the demand for children is unambiguously negative. An increase in the price of market inputs reduces the demand for children, assuming that market inputs and child time are substitutes in production and that the negative effect of a rise in market input prices on the demand for home

goods and thus on demand for child labor is greater than the positive effect it would have on substitution of children for market inputs in home production. If market and home goods are substitutes in consumption, an increase in the price of market goods raises or lowers the demand for children, depending on whether the positive substitution effect of market goods and prices on the demand for home goods exceeds or falls short of the negative income effect. A rise in the woman's wage affects the demand for children through three channels: it raises demand for children as a substitute for women's time in home production; if home goods and leisure are substitutes in consumption, it raises demand for home goods and thus for child time inputs; and it raises the price of home goods relative to other consumption goods, reducing the demand for home goods and child labor. If the first two effects dominate the negative own price effect, then an increase in women's wages raises the demand for children.[20] Finally, an increase in the number of adults is equivalent to an exogenous increase in demand for home goods which also unambiguously raises the demand for child (and female) labor inputs.

The hypothesized signs on the reduced form demand for children are as follows:

$$N = N(\overset{+}{P_m}, \overset{-}{w_w}, \overset{-}{P_x}, \overset{+}{P_c}, \overset{-}{V}; \overset{+}{C}, \overset{+}{A}) \tag{3.8}$$

and where an increase in the number of adults in the household would raise the demand for child labor through its effect on the demand for home goods. Child fostering occurs because of the difference between the optimal number of children needed for home production (N^*) and the number of own children of household members. Factors that raise the "net" demand for child labor, N^*-C, will lead the household to foster in more children and foster out fewer. The signs on the demand for foster children are therefore identical to equation (3.8) and those on the supply of foster children are the reverse of equation (3.8).

An important prediction of this model of fostering as child-labor adjustments is that the coefficients on reduced form equations for fostering in and out should be "symmetric"--opposite in sign and equal in magnitude. Asymmetry would arise if the motivation for sending and receiving foster children is different--that is, if the demand for foster children arises from the need for child labor but the supply arises from parents' investments in the human capital of their children, such as schooling or other training. There are many reasons why symmetry may be violated, however, even if both sides of the fostering market are motivated by child-labor considerations. Differential transactions costs on the two sides of the market may make fostering on one side appear less sensitive to small changes in exogenous variables. For example, if parents get utility from the presence of their children in the household, then there will be an additional cost of

[20] When women are not engaged in market production their value of time exceeds the market wage. In that case both the shadow price of women's time and the shadow price of home goods are endogenously determined.

fostering out children not present on the fostering in side. The symmetry will also be violated if foster and own children are not perfect substitutes in home production.

Specification of the Variables for the Reduced Form

The dependent variable could be measured as a "net" demand for child labor -- the difference between the number of children fostered in and fostered out -- and estimated using ordinary least squares. This specification would be closest to the tradition of the theoretical model, but it would also constrain the coefficients on the sending and receiving sides of the market to be equal and of opposite sign. Since the differences in the determinants on the two sides of the market are of analytic interest, equations for fostering out and fostering in will be estimated separately so that the determinants of the sending and receiving decisions can be compared. The *dependent variables* for the four equations are the number of girls 7-14 fostered out, the number of girls 7-14 fostered in, the number of boys 7-14 fostered out, and the number of boys 7-14 fostered in (see Table 1).

Adult household composition variables include the number of male and the number of female adult household members. Adult household members are defined as persons 15 years or older who ate and slept with the household for at least 3 of the past 12 months. A dummy variable is also included for female-headed households, which may have fewer sources of other income, be more likely to participate in the market, and thus have greater need for child labor as a substitute in home production.

Past fertility and child mortality of the household is captured by variables that count the number of daughters 7-14 and sons 7-14 of household members, including children who are living with their parents and who are living away.

Average completed years of schooling for women is used as a proxy for women's opportunity cost of time.[21] Wages are observed only for a small number of women. As a proxy for wages, an increase in women's schooling should raise the demand for child labor in performing household chores, raising the number of children fostered in and reducing the number fostered out. This effect will be magnified if women with schooling also prefer that their own children enroll: in that case, the household's own children have less time to devote to household chores and the probability of fostering in should increase. If educated women prefer that their children attend school (at home), they should be more reluctant to foster them out. Female schooling is not observed for households with no women; the value for schooling in womanless households has been set equal to zero and a dummy variable denotes households with no women. If children are a substitute for

[21] The schooling of the head of household was included in other regressions, with a significant positive sign in the fostering in regression and a negative sign in the fostering out regression. Inclusion of this variable, a proxy for household wealth, rendered female schooling and household income per adult insignificant, however.

women in home production, then the absence of a woman might be expected to raise the number of children fostered in. On the other hand, the reverse might be true if children require some female supervision in home production. The dummy variable for no woman is included only in the fostering in regressions since, by the definition of fostering used here a child cannot be fostered out from a womanless household.

TABLE 1: Description of variables

Variable	Description
Dependent Variables	
GIRLSOUT[a]	Number of girls 7-14 fostered out
BOYSOUT[a]	Number of boys 7-14 fostered out
GIRLSIN	Number of girls 7-14 fostered in
BOYSIN	Number of boys 7-14 fostered in
Independent Variables	
MEN	Number of male household members >14 years
WOMEN	Number of female household members >14 years
GIRLS	Number of daughters 7-14 living at home + those fostered out
BOYS	Number of sons 7-14 living at home + those fostered out
NOWOMAN[b]	1 if household has no adult female, 0 otherwise
SCHFEM	Mean years of schooling of women in household
PINCOME	Log of permanent income (consumption) per adult
HEADFEM	1 if household head is female, 0 otherwise
COTTON	1 if household grew at least one hectare of cotton, 0 otherwise
ABIDJAN	1 if household is in Abidjan, 0 otherwise
TOWNS	1 if household is in urban area other than Abidjan, 0 otherwise
SAVANNA	1 if household is in rural savanna, 0 otherwise
WFOREST	1 if household is in rural west forest, 0 otherwise
EFOREST	1 if household is in rural east forest, 0 otherwise (left out)
CLASS/SCH[c]	Number of classes at the nearest primary school
DPRIM[c]	Distance in kilometers to the nearest primary school
KIDWORK[c]	1 if children under 12 in village work for a wage, 0 otherwise

[a]Defined only for households with own children in the relevant age group, of the relevant sex.

[b]Included only in fostering in regressions since, by the definition of fostering used here, a child cannot be fostered out from a womanless household.

[c]Variables available for rural regressions only.

Annual consumption expenditure per adult is used as a proxy for household *permanent income*. The sum of annual consumption expenditure, the value of home production consumed, and an imputed value of services from durable goods was divided by the number of adult household members age 15 or older and

expressed in logarithmic form.[22] The level of household consumption expenditure is potentially endogenous to fostering decisions directly, through the labor supply of foster children in home production, and indirectly, as children substitute for adults in home production, allowing greater adult labor force participation. The consumption variable has been instrumented using variables representing productive assets and human capital of the household. [23]

A dummy variable is included for cultivation of *cotton*, because cotton harvesting is highly intensive in child labor in other countries (Levy,1985; Mueller, 1976).[24]

Regional dummy variables are included for households living in Abidjan (the largest city, with one fifth of the population), in urban areas other than Abidjan, and in the rural savanna and west forest regions. The left-out dummy variable is for households in the rural east forest. The coefficients on these variables can be interpreted as reflecting regional differences in the cost of living (including child maintenance and schooling costs) relative to the opportunity cost of time. [25]

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[22] The household consumption variable was computed by Kozel (1987). It includes: food expenditure and the value of home production consumed by the household; expenditure on transportation , fuel, services, leisure activities, gifts and ceremonies, clothing, water and electricity, education , medical care, and transfers to other households; imputed value of services for durable goods, including automobiles; rent; and imputed rent for owner-occupied housing in urban areas.

[23] The exogeneity of consumption per adult was rejected in two of the four regressions, using a test suggested by Smith and Blundell (1986) for models with limited dependent variables. The four dependent variables were regressed on the actual value of annual household consumption per adult (INCOME), the residuals from a least-squares prediction of income, and the other independent regressors in Table 1. A sufficient condition for the value of annual household consumption per adult to be weakly exogenous is that the regression coefficient on the residuals (RESID) from the prediction of income equal to zero. The exogeneity of consumption was rejected for both fostering in regressions. Instruments for income included: schooling of the household head; the head's age and age squared; hectares of land available; dummy variables for households that cultivate at least one hectare of coffee and cocoa; the value of cattle owned by the household; the value of sheep and goats owned by the household; dummy variables for households that possess a sewing machine, transform cassava into attieke for sale, and transform peanuts or palm nuts into oil for sale; and living area in square meters. The R^2 for the OLS regression of the prediction of income was .56.

[24] We assume that household decisions to engage in agricultural production and the choice of crops are made over a longer time horizon, requiring substantial investments and gestation periods, and are thus not jointly endogenous with short-run child fostering decisions. The amount of land cultivated was considered endogenous to child labor decisions, however. When total land available was entered, it was never significant in any regression. Other agricultural variables were either insignificant or uninterpretable. For example, the coefficient on the value of cattle owned by the household was significant in three of the regressions, but always positive. Since income was already controlled for and tending cattle is not generally a task allocated to children, the coefficient was difficult to interpret in terms of the model. Similar problems arose with dummy variables for coffee and cocoa cultivation and for the value of sheep and goats.

[25] Fostering differences by ethnic group have received a great deal of attention by anthropologists. Surprisingly, when dummy variables for the five main ethnic groups were entered in these regressions with region also controlled for, none of the ethnic coefficients were significant in the fostering in or out of girls or the fostering in of boys. (Girls were less likely to be fostered in by non-Ivorians, however.) North and South Mande groups were significantly less likely than the Akan to foster out boys. Inclusion of ethnic dummy variables had virtually no effect on the magnitude or significance of other coefficients in the regressions. It is possible that ethnic groups were insufficiently disaggregated to observe differences; alternatively, it may be the case that ethnic differences in other studies can be accounted for almost entirely by differences in socioeconomic status or that fostering decisions are based almost entirely on short-run economic conditions.

Two variables representing the availability and quality of schooling for rural communities are included; they were collected in rural areas only and are identical for all households in the same community. The *number of classes at the nearest primary school* is a proxy for both availability and quality. The standard number of grades in primary school is six; a school with fewer than six classes cannot have the full primary curriculum. In addition, such schools are typically small, community-built, and may have difficulty attracting good teachers and financing recurrent inputs.[26] The second schooling variable is the *distance to the nearest primary school,* in kilometers. Children living too far from a school would have to be fostered out to attend. If school attendance is a reason for fostering children 7-14, one would expect the number of classes to be negatively correlated and the distance to the nearest school to be positively correlated with fostering out, and the reverse for fostering in.

Finally, although very few instances of child wage labor were observed in the household data (and virtually none in rural areas), in 8 rural communities leaders indicated that children under 12 sometimes work for a wage. A dummy variable for the presence of a *child labor market* is included in regressions for rural areas. If fostering is due to demand for child labor, then the presence of a local child labor market should reduce fostering in. The effect on fostering out is ambiguous: on the one hand, households with more child labor than they need can participate in the local market, reducing out-fostering; on the other hand, the availability of local substitutes for the labor of own children make it possible to foster out more children for other reasons (such as schooling or insurance arrangements).

The means and standard deviations of variables are reported in Table 2. The households in the sample had an average of 2.0 men and 2.4 women with 0.88 daughters and 0.93 sons age 7-14 living either at home or away. The subsamples of households with at least one son or daughter 7-14 had more adults--2.3 men and 2.7 women. Only 6.3 percent of households had no woman. Average completed schooling of females is less than two years. The income variable (mean predicted logarithm of consumption expenditure per adult) translates into about $680 per adult at the average 1985 exchange rate of 450 CFA francs per U.S. dollar. The subsamples of households with own children 7-14 have slightly lower income. Only 7.8 percent of all households were headed by women, and only 3-4 percent of households with own children 7-14 were female-headed. Forty-three percent of the households are in urban areas (Abidjan or towns); the subsamples excluding childless households are less urban.

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alternatively, it may be the case that ethnic differences in other studies can be accounted for almost entirely by differences in socioeconomic status or that fostering decisions are based almost entirely on short-run economic conditions.

[26] A survey of communities and schools in rural Mali, which borders Côte d'Ivoire to the north, found that parents perceived these schools to be of lower quality than larger schools with at least one class for each grade (Ainsworth, 1983).

TABLE 2: Variable means and standard deviations

Sample	Entire		Sample with GIRLS > 0		Sample with BOYS > 0	
Variables	Mean	SD	Mean	SD	Mean	SD
Dependent						
GIRLSOUT			0.304	0.601		
GIRLSIN	0.217	0.557	0.194	0.516		
BOYSOUT					0.217	0.515
BOYSIN	0.180	0.543			0.182	0.578
Regressors						
MEN	2.012	1.457	2.255	1.526	2.300	1.555
WOMEN	2.362	1.809	2.728	1.880	2.795	1.900
GIRLS	0.882	1.122	1.727	1.003	1.191	1.197
BOYS	0.929	1.147	1.248	1.223	1.757	1.015
NOWOMAN	0.063	0.243				
SCHFEM	1.658	2.960	1.685	2.764	1.625	2.676
PINCOME	12.631	0.627	12.609	0.588	12.571	0.608
HEADFEM	0.078	0.269	0.034	0.182	0.038	0.191
COTTON	0.071	0.257	0.080	0.271	0.077	0.267
ABIDJAN	0.211	0.408	0.203	0.403	0.185	0.388
TOWNS	0.220	0.415	0.199	0.399	0.201	0.401
SAVANNA	0.190	0.392	0.176	0.381	0.190	0.392
WFOREST	0.200	0.400	0.212	0.409	0.212	0.409
N	1597		816		844	

Notes:

1. Statistics for the three variables available only for rural households (CLASS/SCH, DPRIM, KIDWORK) are reported in Table 5, in the discussion of fostering in urban and rural areas.

2. The entire sample is used for fostering in regressions, the sample of households with at least one girl is used for regressions of girls fostered out, and the sample with at least one boy is used for regressions of boys fostered out. CILSS interviewed 1599 households; one household had to be dropped because of missing values for regressors in the prediction of income and a second household with over 100 members was dropped because of extreme values.

Econometric Models

A Tobit model is used for estimating fostering in regressions, since the dependent variables--the number of boys and girls fostered in--are censored from below at zero.[27] Let y^* be the true demand for foster children and y the observed number of children fostered in. When the true demand y^* is greater than zero, it is observed; when y^* is less than zero, zero is observed. The model is:

$$
\begin{aligned}
& y_i^* = \beta' x_i + u_i , \quad && u_i \sim N(0, \sigma^2) \\
(3.9) \qquad & y_i = y_i^* && \text{if } y_i^* > 0 \\
& y_i = 0 && \text{if } y_i^* < 0 ,
\end{aligned}
$$

where x_i is vector of independent regressors for observation i. The Tobit model assumes that the error is normally distributed with mean zero and constant variance σ^2. Fostering in equations are estimated for the entire sample.

For fostering out regressions, the dependent variables--the number of boys and girls fostered out--are censored from below at zero and from above at the number of own children of the household.[28] A two-limit Tobit model is used:

$$
\begin{aligned}
& y_i^* = \beta' x_i + u_i , \quad && u_i \sim N(0, \sigma^2) \\
& y_i = 0 && \text{if } y_i^* < 0 \\
(3.10) \qquad & y_i = y_i^* && \text{if } 0 < y_i^* < c_i \\
& y_i = c_i && \text{if } y_i^* > c_i
\end{aligned}
$$

where c_i is the upper censoring point (the number of sons or daughters 7-14 in household i), which varies across households. The equations for fostering out are estimated only for households that had at least one own child 7-14, resident or nonresident, of the appropriate sex, since households cannot foster out children they

[27] An alternative, the Poisson count model, takes into consideration both the censored and integer aspect of the dependent variable (Maddala, 1983; Hausman, Hall and Griliches 1984; Cameron and Trivedi 1986). It does not allow for the upper censoring of the fostering out variables, however. These same regressions have been estimated with the Poisson count model (not taking the upper censoring into consideration) in Ainsworth (1989). The major conclusions are not affected.

[28] Thirteen percent of the households with at least one daughter 7-14 fostered out all of them and 9.5 percent of the households with at least one son 7-14 fostered out all of them. When the dependent variable is censored, least squares estimates are inconsistent because the error term is not independent of the regressors (Amemiya, 1984; Maddala, 1983).

don't have. Both Tobit models are estimated using maximum likelihood methods.[29] Standard errors have been corrected to account for the fact that one of the regressors (PINCOME) is a predicted variable.[30]

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[29] The likelihood function for the single-censored Tobit model is:

$$L(\beta, \sigma | y, x) = \Pi_0[\Phi(-\beta' x_i/\sigma)]\ \Pi_1(1/\sigma)\phi[(y_i - \beta' x_i)/\sigma]\ ,$$

where the first product is over all $y_i = 0$, the second product is over all positive values of y_i , and Φ and ϕ are the normal cumulative distribution and probability density functions, respectively. The likelihood function for the two-limit Tobit model is:

$$L(\beta, \sigma | y, x) = \Pi_0[\Phi(-\beta' x_i/\sigma)]\ \Pi_1(1/\sigma)\phi[(y_i - \beta' x_i)/\sigma]\ \Pi_2[1 - \Phi((c_i - \beta' x_i)/\sigma)]\ ,$$

where the first product is over all $y_i = 0$, the second product over all $0 < y_i < c_i$, and the third product over all $y_i = c_i$.

[30] The formula used to estimate the consistent second-stage variance-covariance matrix follows from Muphy and Topel (1985). The consistent second-stage variance-covariance matrix when the first stage is linear and the second stage is maximum likelihood is given by:

$$V2 = L_{22}^{-1} + L_{22}^{-1}[L_2 e' x(x.x)^{-1} L_{12}' + L_{12}(x.x)^{-1} x' e L_2 + L_{12}' 1 L_{12}] L_{22}^{-1}\ ,$$

where L_2 is the derivative of the second-stage likelihood function with respect to the parameters of stage two, $-L_{22}^{-1}$ is the inverse of the second derivative of the second-stage likelihood with respect to stage-two parameters, L_{21} $(= L_{12})$ is the deri- vative of L_2 with respect to stage-one parameters, e is the vector of first-stage residuals, x is the matrix of first-stage regressors, and V1 is the consistent first-stage variance-covariance matrix. See Ainsworth (1989).

4. THE ECONOMIC DETERMINANTS OF SENDING AND RECEIVING DECISIONS

Determinants of Fostering for the Entire Sample

Tobit estimates of the determinants of fostering of girls and boys are presented in Table 3. The coefficients on adult household composition variables are of the expected signs and symmetric: additional adults of both sexes raise the demand for home production, raising the demand for both boys' and girls' labor and the number of children fostered in. The number of men and women have similar effects on the demand for foster children within each regression.[31] Adult household composition variables are significant in all regressions but one: the number of men has no effect on fostering out girls, while the number of women has a weak negative effect.

As expected, own children and foster children are substitutes: the more daughters household members have, the more girls are fostered out and the fewer are fostered in. The same holds true for sons and boys fostered out. There are interesting asymmetries, however. If sons and daughters are perfect substitutes in home production, the effect of an additional son should be the same as the effect of an additional daughter on the number of children fostered. The results show that sons and daughters are substitutes for each other and for foster children of both sexes in fostering in regressions (2) and (4). The coefficients on sons and daughters in the regression for foster boys (4) are quite similar, while in the foster girls regression (2) the coefficient on daughters is about twice the size of that for sons.[32] Sons and daughters are not substitutes in fostering out decisions, but these results may be affected by the fact that many households in regressions (1) and (3) do not have a child of the opposite sex.[33]

The absence of an adult woman significantly and greatly reduces the number of children of both sexes fostered in. This is contrary to what might be expected if children are substitutes for women in home production. Perhaps some minimum amount of women's supervision is necessary to use child labor effectively. Alternatively, for child welfare reasons households may be reluctant to send their adolescent children to live in a household of men. Since men generally do not shop for food, cook, or do laundry, children may not be

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[31] Wald tests failed to reject the hypothesis that the coefficients on men and women are identical in each of the four regressions in Table 3.

[32] Wald tests failed to reject the hypothesis that the coefficients on sons and daughters are identical in each of regressions (2) and (4), however.

[33] Two other specifications of GIRLS and BOYS were tried and rejected. First, children of each sex were broken into age groups 7-10 and 11-14. The equality of coefficients for children of the same sex and different age groups could be rejected in only one case--for the coefficients on girls 7-10 and 11-14 in the fostering out regression for girls. In a second specification, quadratic terms for girls and boys and an interaction between girls and boys were entered. The three added quadratic terms were jointly significant only in the regression for girls fostered in.

TABLE 3: Tobit estimates, fostering of girls and boys

Dependent Variable:	GIRLSOUT (1)			GIRLSIN (2)			BOYSOUT (3)			BOYSIN (4)		
Regressors	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$
MEN	-0.218	(-1.36)	-.0262	0.293†	(3.84)	.0435	-0.411‡	(-1.96)	-.0360	0.396†	(4.55)	.0489
WOMEN	-0.265^	(-1.77)	-0.0319	0.298†	(4.74)	.0442	-0.397‡	(-2.32)	-.0348	0.241†	(3.27)	.0297
GIRLS	0.665†	(2.71)	.0801	-0.309†	(-3.63)	-.0458	-0.121	(-0.68)	-.0106	-0.235‡	(-2.24)	-.0290
BOYS	0.0109	(0.07)	.00131	-0.137^	(-1.71)	-.0203	0.577‡	(2.06)	.0506	-0.270†	(-2.80)	-.0333
NOWOMAN[a]				-1.638†	(-2.99)	-.243				-1.239‡	(-2.23)	-.153
SCHFEM	-0.237‡	(-2.26)	-.0285	-0.00904	(-0.26)	-.00134	-0.253‡	(-2.05)	-.0222	-0.0117	(-0.26)	-.00144
PINCOME	0.474	(0.66)	.0571	1.416†	(4.02)	.210	-0.0423	(-0.05)	-.00371	0.903‡	(2.33)	.1114
HEADFEM	-2.452^	(-1.81)	-.295	0.827†	(3.11)	.123	-3.930‡	(-2.25)	-.345	0.0523	(0.15)	.00645
COTTON	-1.477^	(-1.89)	-.178	0.206	(0.51)	.0305	-1.526	(-1.59)	-.134	-0.767	(-0.18)	-.0946
ABIDJAN	-0.338	(-0.42)	-.0407	-1.602†	(-3.97)	-.238	0.882	(0.89)	.0774	-1.477†	(-3.33)	-.182
TOWNS	-0.537	(-0.82)	-.0647	-0.749‡	(-2.45)	-.111	0.232	(0.28)	.0203	-0.278	(-0.85)	-.0343
SAVANNA	0.321	(0.52)	.0386	-0.500	(-1.52)	-.0742	0.319	(0.44)	.0280	-0.0323	(-0.10)	-.00399
WFOREST	-0.194	(-0.37)	-.0234	-1.144†	(-3.57)	-.170	-0.759	(-1.16)	-.0666	-0.783‡	(-2.51)	-.0966
Constant	-7.768	(-0.85)		-20.093	(-4.42)		-1.464	(-0.13)		-14.345	(-2.87)	
σ	3.473	(8.21)		2.084	(12.02)		3.734	(6.88)		2.302	(17.45)	
LOGL	-595.75			-954.52			-497.60			-851.89		
χ^2 [b]	52.30			124.36			52.72			84.62		
N	816			1597			844			1597		
Mean of dep. var.	.304			.217			.217			.180		

†Significant at .01 or less. ‡Significant at .05. ^Significant at .10.

[a]NOWOMAN is excluded from fostering out regressions because, by the definition of fostering used here, a child cannot be fostered out from a womanless household.

[b]Likelihood ratio test for joint significance of all coefficients, distributed as χ^2_r where $r = 12$ in regressions (1) and (3) and $r = 13$ in (2) and (4).

adequately cared for in an all-male household. Further, it may not be culturally acceptable to send a young unmarried girl to such a household, even if it is a household of relatives.

Among households with women, higher average female schooling reduces the number of girls and boys fostered out but does not seem to affect fostering in decisions. The coefficients on female schooling imply that a one-year increase in the average schooling of women in the household reduces the number of girls fostered out by 0.029 and the number of boys fostered out by 0.022.[34] The negative effect of female schooling on fostering out is consistent with a child labor explanation when schooling is a proxy for female wages; however the lack of significance of female schooling on fostering in casts doubt on this interpretation. It may be that women with schooling prefer that their children attend school (at home) instead of being fostered out to work. In that case, the lack of significance of female schooling in the fostering in regressions would imply that schooling of own children does not generate additional demand for foster children as a substitute for own children in home production.

If home production is normal, higher income will lead to greater demand for child labor to engage in it. Again, asymmetry in fostering in and out decisions is observed: higher income households are more likely to foster in children of both sexes, but no less likely to foster out. The insignificance of income in fostering out is strong evidence against the hypothesis that fostering is a way for parents to raise children they cannot afford--a way of "managing" high fertility. Were that the case, one would expect income to have a strong negative effect on fostering out. The income coefficients translate into relatively high elasticities of 0.97 for girls fostered in and 0.62 for boys fostered in.[35]

The coefficients for female-headed households display symmetry in sign across all four regressions and are significant in all but the regression for boys fostered in. Female-headed households are less likely to foster out children of either sex and more likely to foster in girls than are male-headed households. The insignificance of this variable in the regression for boys fostered in indicates that other people's sons are not good substitutes for women's time, compared with own sons, own daughters, or daughters of other households.

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[34] The coefficients of the Tobit model represent $\partial y^*/\partial x$. The coefficients $\partial E(y)/\partial x$ for the one-limit Tobit with lower bound zero are given by $\Phi\beta_i$, where Φ is the normal cumulative distribution function of $\beta'x/\sigma$ evaluated at the mean and the subscript i denotes an explanatory variable. For the two-limit Tobit with lower bound zero and upper limit c_i the expression for $\partial E(y)/\partial x$ is $\beta_i(\Phi_2 - \Phi_1)$, where the density and distribution functions with the first subscript are evaluated at $-\beta'x/\sigma$ and those with the second subscript are evaluated at $(c - \beta'x)/\sigma$.

[35] Income elasticities are calculated from the coefficient of the expected value locus, $\partial E(y)/\partial x$. These elasticities are larger than the long-run income elasticity of demand for children of 0.10 found in Ainsworth's (1988) study of fertility in Côte d'Ivoire.

The coefficient on cotton is significant and negative in the regression for girls fostered out. With income and geographic region controlled for, it would be difficult to give this result any other than a child labor interpretation.[36] The insignificance of cotton in the regression for boys fostered out or for fostering in regressions is perplexing, however. Possibly, the cotton dummy variable is not measuring demand for child labor, but picking up some other dimension of rural-urban differences not accounted for by the regional dummy variables.

Finally, results for regional dummy variables representing relative price differences again reveal asymmetry: households in Abidjan and the rural west forest foster in significantly fewer children of both sexes than households in the rural east forest, but do not foster out more children. Abidjan households are the least likely to foster in children among all regions, when income and adult household composition are controlled for. Child costs may be sufficiently high relative to the price of market inputs as to encourage substitution of other inputs for children in home production. None of the regional variables is significant in fostering out regressions.

Rural vs. Urban Fostering and the Effect of Schooling Variables

Descriptive statistics for rural and urban subsamples are presented in Table 4. Rural households foster out more children and foster in fewer children than do urban households on average. They have slightly fewer men and more women than do urban households. Rural households also have more sons and daughters 7-14 than do urban households, but this is evidently due to a larger proportion of households with children in rural areas; in subsamples of households in each area with at least one son or daughter 7-14, the number of sons and daughters in rural and urban households is similar. Urban households are twice as likely to be womanless as rural households but are also twice as likely to be headed by a woman. The difference in average women's schooling between regions is remarkable: the women in rural households have an average of only 0.6 years of formal schooling, compared to 3.1 years for women in urban areas. Mean annual income per adult in rural areas is less than half that in urban areas--$466 and $1116 per adult in the unrestricted samples of rural and urban households, respectively. Regional dummy variables for the savanna and west forest are included in rural regressions (the east forest is the excluded region) and a dummy variable for households in Abidjan is included in the urban regressions. Rural households are distributed roughly one third in each of the rural zones, while almost half of the urban sample lives in Abidjan. The mean distance of rural households to the nearest primary school was 0.6 kilometers and the nearest school had about six grades. Almost 18 percent of rural households lived in a village where children under 12 reportedly work for a wage.

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[36] The cotton variable remains significant when dummy variables controlling for the ethnic group of the household are also included.

TABLE 4: Variable means and standard deviations, urban and rural samples

Sample:	Entire		Sample with GIRLS > 0		Sample with BOYS > 0	
Variables	Mean	SD	Mean	SD	Mean	SD
			Rural Sample			
Dependent						
GIRLSOUT			0.344	0.651		
GIRLSIN	0.172	0.505				
BOYSOUT					0.224	0.531
BOYSIN	0.164	0.556				
Regressors						
MEN	1.915	1.328	2.092	1.360	2.166	1.430
WOMEN	2.413	1.778	2.703	1.888	2.799	1.883
GIRLS	0.925	1.134	1.721	1.011	1.185	1.213
BOYS	1.007	1.180	1.273	1.238	1.765	1.409
NOWOMAN	0.0419	0.200				
SCHFEM	0.572	1.317	0.644	1.347	0.612	1.278
HEADFEM	0.0518	0.222	0.0266	0.161		
PINCOME	12.254	0.380	12.289	0.372	12.257	0.400
COTTON	0.117	0.321	0.125	0.331	0.120	0.325
SAVANNA		0.334	0.472	0.295	0.457	0.309
0.462						
WFOREST	0.351	0.478	0.355	0.479	0.346	0.476
CLASS/SCH	5.991	2.633	6.057	2.618	6.103	2.722
DPRIM	0.564	1.514	0.523	1.474	0.537	1.515
KIDWORK	0.176	0.381	0.160	0.367	0.153	0.360
N	908		488		581	
			Urban sample			
Dependent						
GIRLSOUT			0.244	0.514		
GIRLSIN	0.277	0.615				
BOYSOUT					0.206	0.487
BOYSIN	0.200	0.526				
Regressors						
MEN	2.139	1.604	2.497	1.713	2.512	1.715
WOMEN	2.295	1.849	2.765	1.870	2.788	1.930
GIRLS	0.826	1.104	1.735	0.992	1.199	1.174
BOYS	0.826	1.094	1.210	1.200	1.745	0.961
NOWOMAN	0.0914	0.288				
SCHFEM	3.088	3.800	3.233	3.509	3.233	3.427
HEADFEM	0.113	0.317	0.0457	0.209	0.0552	0.229
PINCOME	13.127	0.535	13.086	0.523	13.070	0.546
ABIDJAN	0.489	0.500	0.506	0.501	0.479	0.500
N	689		328		326	

Tables 5 and 6 present Tobit estimates of fostering by households in rural and urban areas, respectively. Since fostering can occur within and between urban and rural areas, there is no particular reason to expect symmetric results within one area.

Turning first to *rural households* (Table 5), there is a marked asymmetry in the determinants of fostering in and out. The only significant household-level variables in fostering out regressions are the number of women and the number of children of the same sex: the more women there are relative to own children of both sexes, the less likely are children to be fostered out. Male household composition shows no significance in fostering out regressions. Two explanations come to mind: (1) children 7-14 substitute for the time of rural women in home production, but they are not good substitutes for men's tasks; or (2) raising children 7-14 requires women's time (not men's), so when the number of women is insufficient to properly care for them, the children are fostered out. Anthropological evidence and the data on the economic activities of children cited earlier suggest that children 7-14 make important contributions to home production and require minimal child-care time inputs from the mother. It seems more plausible that children are substituting for women's time. The coefficient on women's schooling--a proxy for the value of women's time--should be negative if this is the case, but it is insignificant in both fostering out regressions. The mean level of schooling was very low however, and there was not much variation in rural areas. It may also be he case that schooling is a poor proxy for the value of women's time in rural areas where there are few opportunities for wage employment.

The results for fostering in regressions are supportive of demand for child labor explanations, but strongly suggest that foster boys and girls perform different tasks in rural areas. Both adult household composition coefficients are significant and of the predicted signs in the girls in regression, while only the coefficient on male adults is significant in the boys in regression. Adults of both sexes thus generate demand for foster girls' labor, while only men generate demand for foster boys' labor. Note also that sons and daughters are substitutes for girls fostered in, while only sons are substitutes for boys fostered in.[37] Household income per adult is a particularly important determinant of the number of girls fostered in, corresponding to an income per adult elasticity of 1.11, but it apparently does not affect demand for the services performed by foster boys in rural areas. This is what one would expect, for example, if own children and foster girls perform housework, a non-marketed home-produced good that is normal, while boys are engaged in production of marketed agricultural goods. In the latter case, household demand would not affect the level of production, while in the former it would. Female-headed households demand significantly more foster girls, but not foster boys. Further evidence of the different types of work of boys and girls is that the coefficient on KIDWORK is significant, negative and quite large in the boys in regression, but not in the girls in regression, indicating that child wage labor is a substitute for fostered-in boys, but not for girls.

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[37] Wald tests failed to reject the hypothesis that the coefficients on BOYS and GIRLS in regressions (2) and (4) are identical.

TABLE 5: Tobit estimates, fostering by rural households

Dependent Variable:	GIRLSOUT (1)			GIRLSIN (2)			BOYSOUT (3)			BOYSIN (4)		
Regressors	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$
MEN	-0.131	(-0.64)	-.0170	0.369†	(2.86)	.0411	-0.233	(-1.00)	-.0227	0.339‡	(2.44)	.0365
WOMEN	-0.366^	(-1.72)	-.0475	0.276†	(3.18)	.0308	-0.650†	(-2.61)	-.0633	0.177	(1.52)	.0191
GIRLS	0.809‡	(2.36)	.105	-0.317‡	(-2.48)	-.0353	0.00980	(0.05)	.000955	-0.148	(-0.86)	-.0160
BOYS	0.0354	(0.17)	.00459	-0.247‡	(-2.18)	-.0275	0.840‡	(2.40)	.0818	-0.411†	(-2.77)	-.0443
NOWOMAN[a]				-1.227	(-1.34)	-.137				-1.694^	(-1.66)	-.183
SCHFEM	-0.284	(-1.29)	-.0369	0.127	(1.61)	.0142	-0.217	(-1.08)	-.0211	0.143	(1.41)	.0154
PINCOME	1.097	(1.01)	.142	1.727†	(3.27)	.193	-0.340	(-0.30)	-.0331	0.919	(1.43)	.0991
HEADFEM[a]	-2.118	(-1.11)	-.275	1.762†	(3.42)	.196				-0.281	(-0.44)	-.0303
COTTON	-1.207	(-1.44)	-.157	0.752	(1.56)	.0838	-1.143	(-1.31)	-.111	0.160	(0.30)	.0172
SAVANNA	0.147	(0.23)	.0109	-0.499	(-1.25)	-.0556	0.230	(0.35)	.0224	0.145	(0.34)	.0156
WFOREST	-0.176	(-0.32)	-.0228	-1.214†	(-2.83)	-.135	-0.456	(-0.75)	-.0444	-1.032†	(-2.61)	-.111
CLASS/SCH	-0.0455	(-0.43)	-.00591	0.0448	(0.79)	.00500	-0.00989	(-0.09)	-.000963	0.0555	(0.93)	.00598
DPRIM	0.247^	(1.80)	.0321	0.0932	(1.14)	.0104	0.106	(0.80)	.0103	-0.0203	(-0.17)	-.00219
KIDWORK	0.635	(1.02)	.0824	-0.0887	(-0.24)	-.00989	0.372	(0.60)	.0362	-1.009‡	(-2.12)	-.109
Constant	-15.535	(-1.13)		-24.523	(-3.59)		2.064	(0.14)		-14.765	(-1.80)	
σ	3.372	(6.76)		2.148	(7.76)		3.231	(5.63)		2.530	(12.18)	
LOGL	-370.33			-451.57			-313.41			-449.52		
χ^2 [b]	45.38			76.68			35.28			39.14		
N	488			908			518			908		
Mean of dep. var.	0.344			0.173			0.224			0.164		

†Significant at .01 or less. ‡Significant at .05. ^Significant at .10.

[a]NOWOMAN is excluded from fostering out regressions because, by the definition used here, a child cannot be fostered out from a womanless household. HEADFEM is excluded from regression (3) because of insufficient variation.

[b]Likelihood ratio test of joint significance of all coefficients, distributed χ^2_r, where $r = 13$ in regression (1), 14 in regressions (2) and (4), and 12 in regression (3).

The cotton dummy variable is insignificant in all of the rural regressions. The lack of response of fostering to this and other agricultural variables comes as some surprise, since farming is the major activity in rural areas and presumably an activity in which foster children could be of assistance.[38] Possibly foster children (as well as hired children, where a market exists) are poor substitutes for own children in agriculture. There is also a pool of adult migrant labor and sharecroppers from neighboring countries available year round that is perhaps more productive in agricultural tasks relative to cost than foster, hired, or own children.[39] These results confirm our earlier suspicion that in the larger sample the cotton dummy variable may well have been measuring some dimension of urban-rural differences not reflected in regional dummy variables. Alternatively, the cotton variable may not be significant because of the small sample, particularly in fostering out regressions.

Finally, the evidence that fostering responds to the availability and quality of schooling in rural areas is weak. Across all four regressions in Table 5 coefficient signs on schooling variables are as expected, but generally insignificant. As was pointed out earlier, the vast majority of villages had their own primary schools and the variability of the distance to a primary school is quite low. Parents do not foster their children to go to primary school in rural areas because the children can attend school while living at home.

The results in Table 6 show *no* significant economic determinants of fostering out in *urban households*. The sample size for fostering out children in urban areas is small--fewer than 330 households--and may account for the poor results. The absence of variables measuring the cost and quality of schooling in urban areas is regrettable; this conceivably could be an important reason for fostering between urban areas and from urban to rural areas. There is ample evidence of fostering in for child labor in urban areas, however. In regressions (2) and (4), daughters are substitutes for foster children of both sexes, while sons are substitutes for neither. It would seem that daughters and foster children perform similar types of work in urban areas, which is different than the work (if any) performed by sons. This is confirmed by the fact that, unlike in rural areas, income is a significant determinant for fostering in both girls and boys. The coefficients correspond to per adult income elasticities of 0.90 for girls and 0.68 for boys. The income elasticity for girls in urban areas is thus lower than in rural areas (1.11). The highly significant and large negative coefficient on the Abidjan dummy variable indicates that the higher cost of maintaining foster children in Abidjan exceeds the higher value of foster child time in housework. Two variables representing the opportunity cost of women's time--female schooling and female headship--are insignificant on both sides of the fostering market in urban areas. This

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[38] When the larger set of agricultural variables (LAND, COFFEE, COCOA), was added to rural regressions LAND was significant (positive) only in the girls in regression and it rendered insignificant the income coefficient.

[39] Two-thirds of farm households reported outlays in cash or in kind for farm labor. Of the 57 rural communities in the survey, 88 percent reported that people migrate into the villages temporarily to work; these migrant workers are overwhelmingly from Mali and Burkina Faso. In addition, 70 percent of villages reported mutual exchanges of labor within the community.

comes as some surprise, since female heads in urban areas are more likely to be engaged in market work than female heads in rural areas and one would expect the need for foster children as substitutes for women's time in home production to be greater. It is also surprising that women's schooling has no effect, since it presumably reflects opportunity costs better in urban areas, where the opportunities for market work are greater. Again, however, this result may reflect a problem of insufficient variation within urban areas; recall that in the regressions for the national sample the coefficient on women's schooling was significant in both fostering out regressions.

TABLE 6: Tobit estimates, fostering by urban households

Dependent Variable:	GIRLSOUT (1)			GIRLSIN (2)			BOYSOUT (3)			BOYSIN (4)		
Regressors	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$	β	T	$\partial E(y)/\partial x$
MEN	-0.322	(-1.25)	-.0381	0.235‡	(2.41)	.0458	-0.632	(-1.34)	-.0432	0.445†	(3.66)	.0608
WOMEN	-0.0649	(-0.29)	-.00768		0.325†		(3.30)	.0633		-0.0477	(-0.16)	-.00326
	0.311†	(3.21)	.0425									
GIRLS	0.298	(0.85)	.0353	-0.334†	(-2.93)	-.0650	-0.323	(-0.80)	-.0221	-0.365†	(-2.88)	-.0499
BOYS	-0.0167	(-0.06)	-.00198	-0.00186	(-0.02)	-.00362		0.166		(0.32)	.0114	
-0.134	(-1.11)	-.0183										
NOWOMAN[a]				-1.755‡	(-2.48)	-.342				-0.979	(-1.57)	-.134
SCHFEM	-0.196	(-1.46)	-.0232	-0.0202	(-0.45)	-.00393	-0.410	(-1.58)	-.0280	-0.0529	(-1.03)	-.00723
PINCOME	0.0183	(0.02)	.00217		1.275‡		(2.56)	.248		0.791	(0.41)	.0541
	0.998‡	(1.99)	.136									
HEADFEM	-2.562	(-1.25)	-.303	0.238	(0.74)	.0463	-3.711	(-1.35)	-.254	0.201	(0.56)	.0275
ABIDJAN	0.329	(0.49)	.0390	-0.722‡	(-2.53)	-.141	0.622	(0.61)	.0425	-1.025†	(-3.31)	-.140
Constant	-2.058	(-0.14)		-18.865	(-2.82)		-12.385	(-0.48)		-15.745	(-2.32)	
σ	3.489	(4.63)		1.982	(8.52)		4.996	(3.35)		1.960	(8.13)	
LOGL	-219.63			-492.59			-181.18			-389.11		
χ^2 [b]	13.90			50.82			20.78			65.72		
N	328			689			326			689		
Mean of dep. var.	0.244			0.277			0.206			0.200		

†Significant at .01 or less. ‡Significant at .05. ˆSignificant at .10.

[a]NOWOMAN is excluded from fostering out regressions because, by the definition used here, children cannot be fostered out from womanless households.

[b]Likelihood ratio test for joint significance of all coefficients, distributed χ^2_r, where r = 8 in regressions (1) and (3) and r = 9 in regressions (2) and (4).

5. TESTING THE SYMMETRY OF FOSTERING DECISIONS

The Tobit models have allowed us to examine separately sending and receiving decisions. In this section, the model of friction first proposed by Rosett (1959) is adapted to jointly estimate both sides of the fostering market without restricting slope coefficients or intercepts to be the same. Rosett's model is a generalization of the basic Tobit model. Whereas the Tobit model allows for a mass point at one extreme of the conditional cumulative distribution of the dependent variable, Rosett allows the mass point to occur anywhere in the distribution. Rosett's application of the model was in analyzing the effect of changes in yield on asset holdings. He speculated that because of transactions costs, asset holdings might not respond to small changes in yield. There would thus be a range over which the dependent variable is insensitive to changes in the independent variables. Once this "friction" has been overcome, asset holdings respond to changes in yield, the direction of response depending on the sign of the change in yield. Rosett's original model allowed for different intercepts (representing differential friction) on the buying and selling sides of the asset market, but he assumed that the relation between yields and assets was the same on both sides once the friction is overcome.

In the application to fostering, the Rosett model assumes that there is a range over which fostering in and out does not respond to small changes in the independent variables. The existence of friction in the fostering market can be explained by transactions costs, which may differ in magnitude between sending and receiving decisions. Further, if parents derive utility from the presence of their children, there will be additional costs to cause friction on the sending side. Here, Rosett's model is adapted to allow both the intercepts and the slope coefficients to vary on the two sides of the market. The symmetry of coefficient estimates for fostering in and out can then be formally tested.

Let y_i^* be the desired <u>net</u> number of children fostered in, which can be positive or negative, and y_i the observed number. When y_i^* is in the negative range, the relation $y_i^* = \alpha_1 + \beta_1' x_i + u_i$ holds, and when y_i^* is in the positive range, $y_i^* = \alpha_2 + \beta_2' x_i + u_i$ holds, where $\alpha_1 < 0$ and $\alpha_2 > 0$. When y_i^* lies between α_1 and α_2, no fostering is observed ($y_i = 0$); when it lies below α_1 or above α_2 we observe negative or positive net fostering, respectively. The random error u_i is normally distributed as $N(0, \sigma^2)$; it is assumed to be the same on both sides of the market.

$$
(4.1) \qquad \begin{aligned}
y_i &= y_i^* - \alpha_1 && \text{if } y_i^* < \alpha_1 \\
y_i &= 0 && \text{if } \alpha_1 < y_i^* < \alpha_2 \\
y_i &= y_i^* - \alpha_2 && \text{if } \alpha_2 < y_i^* .
\end{aligned}
$$

The Rosett model with differential slopes and intercepts is illustrated in Figure 6 and is estimated using maximum likelihood methods.[40] The dependent variables are the net number of children (NETKIDS), girls (NETGIRLS), and boys (NETBOYS), age 7-14 fostered in. Standard errors have been corrected to account for the fact that one of the regressors (PINCOME) is a predicted variable. Note that the model does not define an upper limit on the number of children fostered out. In order not to violate the constraint that households cannot foster out more children than they have, the model is estimated only for the sample of households with own children, sons, or daughters age 7-14.

Estimates of the Rosett model for fostering of all children 7-14, girls 7-14, and boys 7-14 are qualitatively similar to single-censored Tobit estimates for the restricted sample of households with children in each category (see Appendix A). Our main interest in the Rosett model is to test the symmetry of coefficients on both sides of the market. If symmetry holds, the two sides of the fostering market should be exact images of each other: fostering in coefficients should be equal in sign and magnitude to fostering out coefficients. If transactions costs and other sources of friction are the same, then the intercepts on the two sides of the market should also be equal. The results of Wald tests for the equality of coefficients on the opposite sides of the market are presented in Table 7. The equality of the intercepts and coefficients on the two sides of the market is strongly rejected for all three regressions (test 1). The failure to reject the symmetry of coefficients for the net girls and net boys regressions separately may be due to sample size problems. The equality of all coefficients (test 2) is rejected for the net fostering of children 7-14; the Wald statistics for net fostering of boys and girls separately are not statistically significant, however. The equality of the intercepts cannot be rejected for any of the three regressions (test 3). The coefficients on the number of men and the number of women in the household are equal on the opposite sides of the market (test 4 and 5). The coefficients on the number of girls and the number of boys are *not* equal, however (tests 6 and 7): holding other variables constant, an additional child of either sex generates twice as much out-fostering as it reduces the demand for children fostered in. There are only a few additional cases of asymmetry among the remaining coefficients--the coefficient on female headship in the net boys regression and the west forest coefficient in the net boys and net children regressions.

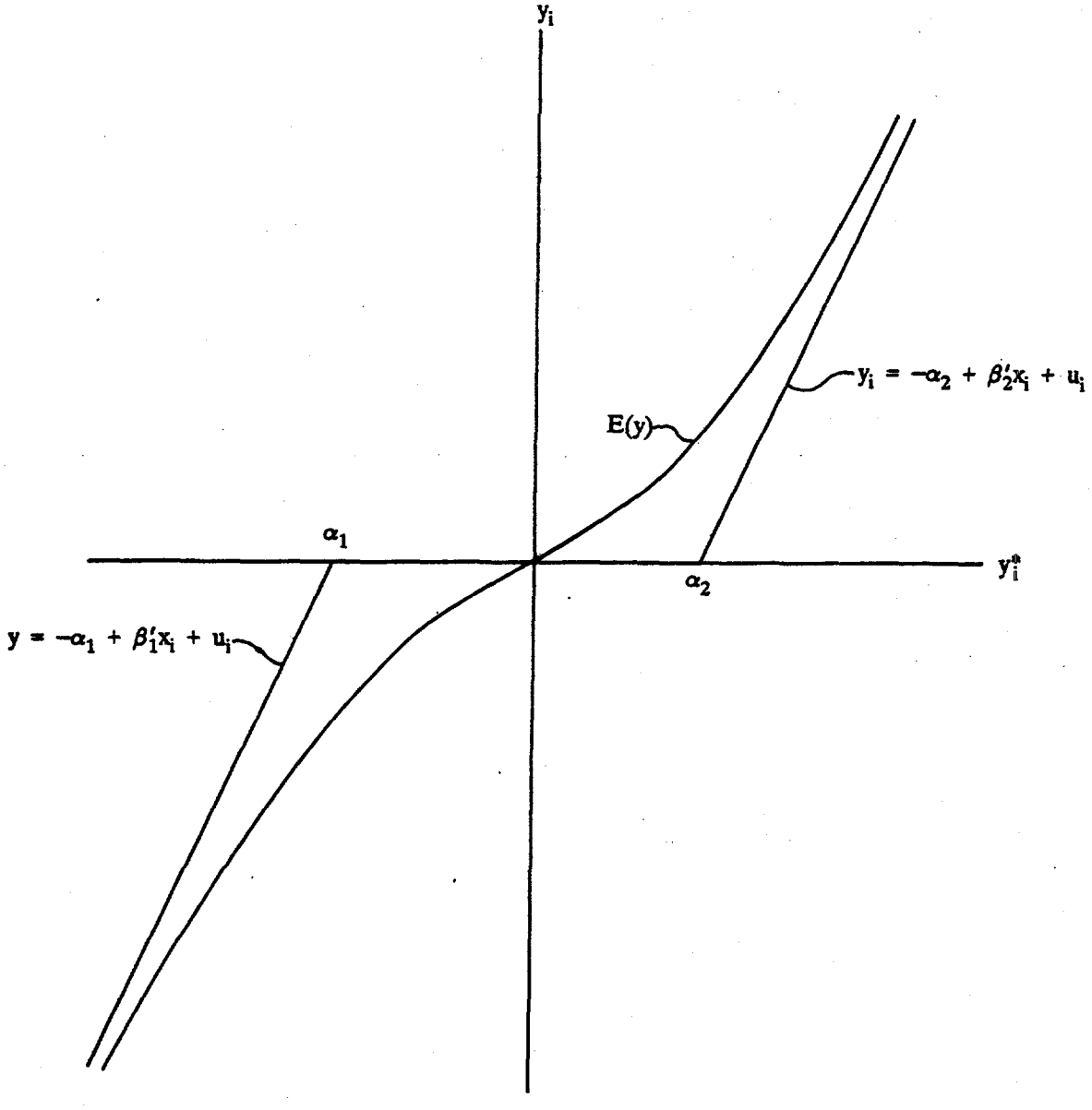
---

[40] The likelihood function has three parts (Maddala, 1983; Rosett, 1959):

$$L(\alpha_1, \alpha_2, \beta_1, \beta_2, \sigma | y, x) = \Pi_0[1/\sigma]\phi[(y_i + \alpha_1 - \beta_1'x_i)/\sigma] \quad \Pi_1\{\Phi[(\alpha_2 - \beta_2'x_i)/\sigma] - \Phi[(\alpha_1 - \beta_1'x_i)/\sigma]\} \quad \Pi_2\Phi[(y_i + \alpha_2 - \beta_2'x_i)/\sigma] ,$$

where the first product is over observations for which $y_i < 0$, the second for which $y_i = 0$, and the third for which $y_i > 0$. Analytical first derivatives were provided to the minimization program (see Appendix 5). Single-censored Tobit estimates were used as staring values for the regressions for boys and girls. For the combined sample of all children 7-14, coefficients were assigned starting values of 0 and the intercepts β_1, and β_2 were assigned values of -1 and 1, respectively. The stopping criterion was set at a change in function value of <.00000001. The functions for all children, girls, and boys converged in 35, 33, and 33 iterations, respectively. I am indebted to Dorothy Seavey for providing the FORTRAN program with analytical first derivatives.

FIGURE 6. The Rosett model of friction with differential slopes and intercepts



These results do not detract from the fact that certain variables--such as household income and regional dummy variables as proxies for relative price differences--have a significant impact on one side of the fostering market but not the other. The strong significance of both adult household composition variables and their equality across both sides of the market is supportive of the hypothesis that child fostering in both directions is in part motivated by the demand by adults for home services, services which children of this age group typically perform. The asymmetry in coefficients for the number of own girls and own boys suggests that other factors may also play into fostering decisions, however. It is also conceivable that the undercount of children fostered out is producing the asymmetric results: The number of own children (GIRLS, BOYS) is the sum of the number of own children at home and those fostered out. An undercount of the children fostered out will result in an undercount of own children for households on the fostering out side of the market. On the fostering in side, however, the count of the number of own children will be unaffected by underestimation of the value of the dependent variable, the number fostered in.

TABLE 7: Wald tests for equality of intercepts and coefficients on opposite sides of the fostering market[a] (r = number of restrictions)

Test	Wald Statistic NETKIDS	NETGIRLS	NETBOYS
1. Equality of all coefficients and intercepts (r = 13)	289.83†	63.85†	209.01†
2. Equality of all coefficients (r = 12)	31.33†	13.66	16.77
3. Equality of intercepts (r = 1)	2.44	2.16	0.42
4. β_{MEN} (r = 1)	0.12	0.04	0.01
5. β_{WOMEN} (r = 1)	0.03	0.21	0.51
6. β_{GIRLS} (r = 1)	5.84‡	5.19‡	0.90
7. β_{BOYS} (r = 1)	3.79^	0.10	3.07^
8. β_{SCHFEM} (r = 1)	0.89	1.42	0.64
9. $\beta_{PINCOME}$ (r = 1)	1.04	0.89	0.02
10. $\beta_{HEADFEM}$ (r = 1)	1.97	0.24	3.03^
11. β_{COTTON} (r = 1)	1.30	0.89	2.44
12. $\beta_{ABIDJAN}$ (r = 1)	0.44	0.91	0.46
13. β_{TOWNS} (r = 1)	0.06	0.20	0.12
14. $\beta_{SAVANNA}$ (r = 1)	1.30	1.54	0.04
15. $\beta_{WFOREST}$ (r = 1)	3.34^	1.50	3.95‡

†Significant at .01 or less. ‡Significant at .05. ^Significant at .10.

[a]Wald test statistics are distributed χ^2_r, where r is the number of restrictions.

6. CONCLUSIONS

Household decisions on child fostering in Côte d'Ivoire are sensitive to economic factors on both sides of the fostering market. Different economic factors determine sending and receiving decisions, however, and there are important differences in the determinants of fostering for girls and boys, and in urban and rural areas.

Multivariate analysis found significant economic determinants of fostering in children of both sexes that were consistent with a *child labor* explanation; there were also indications that excess child labor plays some role in fostering out decisions. Separate regressions for urban and rural households revealed that the determinants of fostering in decisions consistently support a child labor explanation in both areas, while there are no significant economic determinants of fostering out in urban areas and very few in rural areas. These results also suggested that foster girls and boys perform different tasks in rural areas and that sons and daughters in urban areas have different roles. Based on analysis of the activities of children, it was hypothesized that housework was the main activity provided by foster children. Wald tests rejected the symmetry of fostering decisions for children 7-14, implying unequal transactions costs and/or possibly different motivations behind sending and receiving decisions. Symmetry could not be rejected for separate regressions of girls and boys, but this result should not detract from the fact that in all regressions the significant determinants of the two sides of the market are different.

The support for *schooling investments* as an important motivation for fostering out children 7-14 was inconclusive, due to the paucity of variables on the quality and availability of primary schooling. There probably is a group of households for which fostering out reflects schooling investments--sending households of foster children enrolled in secondary school and of those receiving outside support for schooling from their parents. There is a second group of foster children receiving no support from their parents but who are attending school with the support of the host household. The host is paying out about the same in school fees for these children as for their daughters, but far less than is spent on their sons. This would appear not to be an investment by the host household, but rather some type of compensation. It may still be considered an investment by the sending household, which is forgoing the value of the child's labor in the short run. Finally, there is a third group comprising 50-60 percent of foster girls and 30-40 percent of foster boys who are not attending school and for whom fostering decisions are clearly not linked to schooling investments. The parents of these children evidently felt that fostering their children was a better investment than enrolling them in local primary schools.

In a more general sense, the results indicate far more economic determinants of fostering on the demand side (fostering in) than on the supply side (fostering out). This is in sharp contrast to the emphasis in the demographic literature on fostering as a way for households to "manage" the costs of high fertility. Fostering out decisions are insensitive to household income and to the regional dummy variables that serve as proxies for price variations. There is no evidence, therefore, that children are fostered out because parents cannot afford them. On the other hand, there is evidence that fostering in decisions have an economic basis. In addition to the many significant economic determinants of fostering in, foster children perform more housework than own children and host households are making considerable outlays for the schooling and upkeep of foster children.

APPENDIX: Rosett Model Estimates

This Appendix presents Rosett model estimates of the fostering of all children 7-14, girls 7-14, and boys 7-14. For ease of comparison with earlier Tobit results, the Rosett coefficients on the fostering out side of the market have been multiplied by —1 and are presented next to the coefficients for fostering in. Most of the qualitative differences between these results and the Tobit estimates earlier can be explained by the fact that the Rosett sample was restricted to households with own children in each category on both sides of the market.

TABLE A.1: Rosett model estimates, fostering of children 7-14[a]

Dependent Variable:	NETKIDS			
	Fostering out[b]		Fostering in	
Regressors	β	T	β	T
MEN	-0.379†	(-4.09)	0.418†	(4.20)
WOMEN	-0.321†	(-3.83)	0.339†	(3.33)
GIRLS	0.639†	(6.86)	-0.364†	(-3.65)
BOYS	0.453†	(5.21)	-0.247†	(-2.62)
SCHFEM	-0.0895	(-1.58)	0.0281	(0.57)
PINCOME	-0.555	(-1.14)	1.135‡	(2.25)
HEADFEM	-2.005†	(-2.90)	0.961†	(2.81)
COTTON	-0.855‡	(-2.02)	0.234	(0.53)
ABIDJAN	0.783	(1.53)	-1.178‡	(-2.31)
TOWNS	0.209	(0.52)	-0.326	(-0.82)
SAVANNA	0.243	(0.70)	-0.739‡	(-2.10)
WFOREST	0.185	(0.60)	-0.890†	(-2.73)
Constant	5.467	(0.90)	-16.705	(-2.59)
σ	2.191	(24.48)		
LOGL[c]		1622.50		
χ^2[d]		1630.97		
N[e]		1101		
Mean of dep. var		-0.00636		
S.D.		1.182		

†Significant at .01 or less. ‡Significant at .05.

[a]Unconditional expected value coefficients are given by: $\partial E(y)/\partial x_j = \beta_{1j}\Phi_1 + \beta_{2j}(1 - \Phi_2)$, where β_{1j} and β_{2j} are coefficients on regressor x_j for fostering out and fostering in, respectively, and Φ_1 and Φ_2 are the cumulative normal distribution functions of $[(\alpha_1 - \beta_1 x)/\sigma]$ and $[(\alpha_2 - \beta_2 x)/\sigma]$, respectively, evaluated at sample means and coefficient estimates. The value of Φ_1 is 0.204 and of $(1 - \Phi_2)$ is 0.1927.

[b]For ease of comparison with Tobit results, coefficients on the fostering out side have been multiplied by —1.

[c]Value of function at minimum.

[d]Likelihood ratio test for joint significance of all coefficients, distributed χ^2_{34}.

[e]The regression sample is all households with at least one child age 7-14 (i.e., GIRLS + BOYS > 0).

TABLE A.2: Rosett model estimates, fostering of boys and girls 7-14[a]

Dependent Variable:	NETGIRLS				NETBOYS			
	Fostering out[b]		Fostering in		Fostering out[b]		Fostering in	
Regressors	β	T	β	T	β	T	β	T
MEN	-0.216‡	(-2.33)	0.192‡	(1.99)	-0.332†	(-2.65)	0.317†	(2.85)
WOMEN	-0.223‡	(-2.56)	0.268†	(3.31)	-0.303†	(-2.81)	0.216‡	(2.38)
GIRLS	0.659†	(5.54)	-0.317‡	(-2.43)	-0.0174	(-0.17)	-0.124	(-1.02)
BOYS	0.0571	(0.61)	-0.0209	(-0.23)	0.596†	(4.64)	-0.296‡	(-2.20)
SCHFEM	-0.0899	(-1.56)	0.00832	(0.18)	-0.106	(-1.38)	0.0314	(0.46)
PINCOME	-0.441	(-0.98)	0.975‡	(2.16)	-0.365	(-0.59)	0.467	(0.93)
HEADFEM	-1.846^	(-1.91)	1.353†	(3.40)	-2.105‡	(-2.16)	0.161	(0.27)
COTTON	-0.992‡	(-2.32)	0.372	(0.66)	-0.950^	(-1.71)	-0.229	(-0.39)
ABIDJAN	0.498	(1.00)	-1.088‡	(-2.24)	0.632	(0.97)	-1.165‡	(-2.05)
TOWNS	0.0449	(0.12)	-0.265	(-0.67)	0.0561	(0.11)	0.147	(0.36)
SAVANNA	0.245	(0.71)	-0.941^	(-1.90)	0.173	(0.41)	-0.277	(-0.65)
WFOREST	0.192	(0.64)	-0.729^	(-1.88)	-0.394	(-1.01)	-0.620	(-1.57)
Constant	3.948	(0.70)	-14.635	(-2.50)	3.050	(0.39)	-8.819	(-1.36)
σ	1.886	(9.31)			2.145	(16.33)		
LOGL[c]	967.57				893.18			
χ^2 [d]	129.66				113.32			
N[e]	816				844			
Mean of dep. var.	-0.110				-0.034			
S.D.	0.814				0.799			

†Significant at .01 or less. ‡Significant at .05. ^Significant at .10.

[a]Unconditional expected value coefficients are given by: $\partial E(y)/\partial x_j = \beta_{1j}\Phi_1 + \beta_{2j}(1 - \Phi_2)$ where β_{1j} and β_{2j} are coefficients on regressor x_j for fostering out and fostering in, respectively, and Φ_1 and Φ_2 are the cumulative normal distribution functions of $[(\alpha_1 - \beta_1 x)/\sigma]$ and $[(\alpha_2 - \beta_2 x)/\sigma]$, respectively, evaluated at sample means and coefficient estimates. The value of Φ_1 is 0.1994 and of $(1 - \Phi_2)$ is 0.1154 in the regression for girls; the value of Φ_1 is 0.1357 and $(1 - \Phi_2)$ is 0.1115 in the regression for boys.

[b]For ease of comparison with Tobit results, coefficients on the fostering-out side have been multiplied by -1.

[c]Value of function at minimum.

[d]Likelihood ratio test for joint significance of all coefficients, distributed as χ^2_{24}.

[e]The sample for the net girls regression is all households with at least one daughter age 7-14 (i.e., GIRLS > 0) and the sample for the net boys regression is all households with at least one son age 7-14 (BOYS > 0).

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