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THE PARENTAL BEQUEST TO CHILDREN

Arleen Leibowitz*

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National Bureau of Economic Research, Inc.
204 Junipero Serra Boulevard, Stanford, CA 94305

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*Brown University

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The economic literature on schooling choice and earnings in general treats the individual as an independent agent--able to determine the optimal lifetime strategy for maximizing lifetime wealth or utility by an appropriate allocation of resources to investing in schooling (Ben Porath), on-the-job training (Mincer), occupational training (Weiss) or the partaking of leisure activities (Becker and Ghez). Yet the opportunities open to an adult depend to a large extent on his experience as a child.

Recently Haley (1974) and Stephan (1974) have tried to incorporate the investment decisions made before adulthood into the optimal lifetime plan. They extend to the period of specialization (the period when 100 per cent of available time is spent in producing human capital), the problem of maximizing the child's lifetime wealth or utility. Yet it seems clear that the parents, not the child, determine the quantity of this early investment. Further the parents' objective is not necessarily to maximize the child's lifetime income or utility. The present study attempts to shed some light on the parental behavior which produced these endowments by considering them as elements in the parental bequest to children, which enters the parents' utility function along with their own consumption.

In order to provide for their children, parents forego some current consumption. Money income of families is reduced while mothers supply their labor to child care and withdraw from the market, or parents reduce their consumption, in order to pay for their children's education. Many of these choices involve the sacrifice of current resource consumption in order to gain larger future consumption, and may thus be characterized as investment. There exists a considerable variation across households in the amount time and money devoted by parents to children. While the quantity of these resources is determined

by parents, they have an important impact on the endowments a child has at the time he begins to make independent choices. The purpose of this paper is to examine the characteristics of parents which lead to differences in expenditures of time and goods on children, and to relate these differences in expenditures to differences in various measures of well-being of the child.

If the expenditure of resources in childhood affects the outcomes in adulthood, the adult distribution of education and incomes will depend at least partially on investments made in childhood. There is considerable variation in the amount of parental inputs children of various socio-economic statuses receive. The desire to reduce the variance in early inputs provided the rationale for federal government programs such as Head Start and Home Start. Detailed time budget data document the variance. Leibowitz (1974a) and Stafford and Hill (1974), Lindert (1974) show a relationship between adult achievements and variation in time inputs due to varying family size. But the attempts to link up adult achievement with time inputs in childhood made by Lindert (1974), Fleisher (1974) and Leibowitz (1974a), have had to rely on much cruder estimates of time inputs. In the empirical work that follows, we will show a relationship between very specific inputs of time by parents and later achievements of children.

The relationship between some specific parent actions and children's achievement has been demonstrated by psychologists. They have related children's achievement to gross characteristics of the family environment (economic, social, ethnic, or racial) or particular qualities of the parent-child interaction, such as the extent of the parents' authoritarianism, permissiveness, hostility or mother dominance of child rearing.[1] The present study differs from these psychological studies in attempting to relate achievement to the quantity of inputs. This involves a

recognition that the bequest is not costless. To develop an endowment parents will have to forego some purely adult consumption, and redirect resources toward their children. That is, parents face choices and may choose to forego some purely adult consumption in order to endow their children with--or bequeath to their children--the capacity to achieve. The quantity and quality of resources expended on behalf of children are expected to affect the child's ability to achieve. One need not argue that that genetic factors are insignificant or that no other environmental variables affect the child's achievement in order to expect to observe a positive relationship between the expenditure of resources on children and the resulting level of achievement by the child.

We will be looking for evidence of this relationship in data relating to achievement of three to five year old children residing in urban, rural and suburban areas in 1969-1970. Since these data were originally collected for an evaluation of the effectiveness of the educational television program Sesame Street, they will be referred to here as the Sesame data.

Section I will set out a model of parental decisions concerning the bequest to children, and Section II will discuss the Sesame data. In Section III a production function for human capital is estimated in order to determine how quantities of parents' inputs affect the output of one element of the bequest--human capital. In Section IV the derived demand for schooling as part of the bequest is estimated.

I. Investments in Children's Human Capital: A Model of Parental Choice

If children were slaves, so that their earnings accrued to their parents over their entire lifetime, then parental decisions about allocating resources to investment in children could be analyzed in the orthodox lifetime optimal time allocation context.

However, in spite of some acts of generosity by children toward their parents, we must consider that the returns to parental investments generally accrue in the first instance to children, while substantial costs are incurred by parents. The fact that children generally leave their family of origin at a certain age, called the age of emancipation here, is incorporated into our model which assumes that a nuclear family exists for two periods. A nuclear family is defined as a husband-wife unit with one child.[2]

In the first period, children live with their parents, who derive satisfaction from a Hicksian composite "adult" consumption commodity in which children cannot participate (for example, going to nightclubs, or reading novels) and from child-related activities in which children can participate (going on picnics, reading children's books). In the second period children leave the family and only adult consumption activities are available to the parents, but they also derive satisfaction from the endowment of human and physical assets that they pass on to their children at the beginning of period 2. Parents can be conceived of as making a lump sum financial transfer as well as freeing the child to make decisions about whether to build up or run down his endowment of human capital. While a substantial cash transfer is often made at approximately the age of emancipation to pay college costs, for a wedding or setting up a business, it may be argued that many parents leave bequests at their death (i.e., at the end of period 2, rather than the beginning). To accommodate the later case, it is assumed the bequest is known with sufficient certainty to allow the child to borrow against it. The total bequest, E, is defined as:

$$E = M + \rho H$$

where M is the money transfer, H is the human capital stock, and ρ is the parents' valuation of this stock, or their subjective rate of substitution between human and monetary

bequests. It is not necessary that ρ equal the capitalized value of market rents on a unit of human capital, since parents may directly derive utility from the child's possession of the capital.

I assume home-produced human capital is related to the amounts of time and goods spent in activities with children, as well as to the genetic stock of the child, g, which also comes from the parents, but is not a control variable for them given their mate selection; g may be thought of as affecting the productivity of parental inputs.[3] The parents' own attributes, p, also affect the productivity of inputs. The parents' education, for example, may be expected to affect the productivity of time spent with children, and the productivity of purchased inputs as well.

$$H = h(x_3, t_3; g, p). \tag{1}$$

In addition to spending time with children, two other uses of time are defined as:

A_1 = adult oriented consumption in period 1

A_2 = adult oriented consumption in period 2

A_3 = child oriented consumption in period 1

Each of the activities requires time, t, and purchased goods, x,

$$A_i = f_i(t_i, x_i). \tag{2}$$

Parents are viewed as maximizing the concave utility function $u(A_i, E)$ subject to constraints on available time and financial assets.

In addition to allocating time among the A_i's, parents decide on the optimal mix of the bequest portfolio between a money transfer, M, and human capital, H. Time and goods spent with children produce utility directly in period 1, (via A_3) and indirectly in period 2, via the utility to parents of the bequest.

The following vectors, defined so as to have one element for each parent, refer to available time and wage rates. In addition, the family has financial assets, V_o, at the beginning of the first period.

T_j = total time available = $L_j + t_{ij}$ $\quad j = 1,2;\ i = 1,3$ in period 1; $i = 2$ in period 2

L_j = labor market time

t_{1j} = j^{th} adult's consumption time in period 1

t_{2j} = j^{th} adult's consumption time in period 2

t_{3j} = j^{th} adult's time with children in period 1

W_j = market earnings per unit of time in labor market.

The vectors L and t_i are chosen by parents, along with the scalar variables, x_i. P is the price of x_1 or x_2 relative to x_3. Parents face the following problem:

$$\text{Max} \quad u(A_1, A_2, A_3) + \phi(\rho H + M) \tag{3}$$

S.T. (1) and (2) plus the budget constraint

$$X_{a2}P_{a2} + M = (V_o + Y_1 - P_{a1}X_{a1} - X_3)(1+r) + Y_2. \tag{4}$$

The income in periods 1 and 2 can be written in terms of the parental wealth at the beginning of period 1, V_o, plus family earnings, Y_i. Earnings depend on wages and time supplied to the market, which is constrained by the fact that the total time available is fixed at T. In period 1, T must be allocated between the market L, adult consumption and time with children. In period 2, only the first two uses of time are available.[4] In addition, it is assumed that the ultimate responsibility for child care falls upon the mother. The mother must provide for child care if she wants to supply labor to the market or to spend time in nonchild related consumption activities. The wife must buy back her time at a babysitting fee of B/hour

if she wishes to use time in activities apart from children. Thus, the net wage available to the wife in the first period is $W' = (W-B)$ and the opportunity cost of her adult consumption in period 1 is increased by Bt_{11}.

Then t_{ij} is the time input of the j^{th} family member (mother = 1, father = 2) in the i^{th} consumption activity. For ease of notation, the j subscripts will be suppressed, but it is understood that $B_1 > 0$, $B_2 = 0$. Family income can now be written:

$$Y_1 = (W-B)\ L = (W-B)(T - t_1 - t_3)$$

$$Y_2 = W(T - t_2) \tag{5}$$

$$t_i > 0,\ (W-B) > 0,\ B > 0,\ \text{if}\ \ j = 1.$$

Substituting expressions (5) into (4), we form the Lagrangian:

$$L = u(A_1, A_2, A_3) + \phi(\rho H + M) + \lambda[(V + (W)(T - t_1 - t_3) - B(L + t_1) - Px_1 - x_3)(1+r) + W(T - t_2) - x_2 P - M]. \tag{6}$$

Expenditures on goods must be related as follows:

$$\frac{U_{1x}}{(1+r)P} = \frac{U_{2x}}{P} = \frac{\phi'\rho\ \frac{\partial H}{\partial X_3} + U_{3x}}{(1+r)} \tag{7}$$

where $U_{ix} = \frac{\partial U}{\partial A_i} \cdot \frac{\partial A_i}{\partial X_i}$.

Time spent in alternative uses must be related as follows for both mothers and fathers, but recall for fathers, $B = 0$.

$$\frac{U_{1t}}{W(1+r)} = \frac{U_{2t}}{W} = \frac{\phi'\rho\ \frac{\partial H}{\partial t_3} + U_{3t}}{(W-B)(1+r)} \quad \text{where } U_{it} = \frac{\partial U}{\partial A_i} \cdot \frac{\partial A_i}{\partial t_i}.$$

Thus there are two forces which lead mothers to spend time with their children even past the point where $U_{1t} = U_{3t}$. First, since the time spent is productive in generating human capital, the utility of such time is not limited to its consumption component, U_{3t}. Secondly, time spent in activities not involving child care requires a babysitting cost of B, and this acts as a subsidy to child related consumption activities. Note that B does not affect the relative allocation of time in adult consumption between periods 1 and 2. Fathers will maxinize utility at a point where the marginal utility of time with children is greater relative to other consumption time than is the case for mothers, because fathers do not face the cost B, for releasing time for other consumption. The fact that mothers generally are responsible for providing child care--either through the market or on their own--would be a sufficient cause of their spending more time with children, without involving any considerations of the relative inherent productivity of men and women in such activities. Note that the existence of parental wealth, V, does not affect the proportions in which goods and time are allocated to consumption and children unless it is assumed that one of the activities has greater than unitary income elasticity. However, for the same full wealth $Vo + wT$, a family with lesser initial wealth V, and therefore greater wages, W, would be required to have a higher marginal product of time with children relative to goods. (By a comparison of 7 and 8, the same could be said of the use of time and goods in parental consumption.) If the factors which affect W (education, for example) had no effect on the technology of producing commodities or human capital we would expect to see smaller time inputs to both kinds of home production by those with greater W. However, if education also increased the productivity of time in investment, those with higher wages and education might spend relatively more of their time in child investment. It is clear also that women who face

lower babysitting costs (other adults living in the family, or an unemployed husband) will spend less time in child related activities. (See Heckman, 1974.)

The total bequest of human capital, then, will be a function not only of the family's wealth, but also of the time and goods expended in child related activities. This, in turn, will be determined by wage rates, the productivity of time in generating human capital, discount rates and babysitting costs.

II. Sesame Street Data

The model outlined above requires data on time and goods inputs to children of pre-school age as well as data on financial transfers and human capital accumulated at the age of emancipation. It would be nearly impossible to find data on children already nearing adulthood which contained sufficiently reliable information on the quantities of time and goods expended on them before their fifth birthday.[5] It is rare enough to find any quantitative data relating to the quantities of time and goods spent on children. The Sesame data used below, do contain the relevant information on three to five year old children from five cities in the U.S. in 1969.

Fortunately the demand for total bequest can be imputed from data on pre-school children. Parents' demand for schooling can be estimated directly, and the correlation of .7[6] between I.Q. at age four and I.Q. at age 17, allows the use of the early I.Q. as a proxy for the later one.

The data used in this paper, and referred to here as the Sesame data were originally collected by the Educational Testing Service (ETS) for an evaluation of the Children's Television Workshop's television program for pre-schoolers, Sesame Street. In order to evaluate what children learned from viewing Sesame Street, a sample of three to five year old children were

given various tests of learning in the fall of 1969 and the summer of 1970.

The present research uses the fall tests, taken before viewing the program and should not in any way be considered as an evaluation of Sesame Street. In fact, the pretest data have been used precisely to focus more clearly on the effects of the home, without confounding them with the remedial effect of the T.V. program. In addition to the tests of learning, ETS administered to the pre-schoolers' parents questionnaires which provided information on family background and time use by parents and children, and parental aspirations for their children's schooling achievement. The data used in the present study covered a final sample of 943 families who completed both pretest and posttest questionnaires and had their children tested.

The data collection was carried out in five sites in order to choose a sample representative of CTW's target populations. Boston, Durham and Phoenix provided samples of lower SES, urban, black, and white children in the Northeast, South and West. Middle class children living in an eastern city were selected from Philadelphia. Lower socio-economic status children living in a rural area were chosen from rural northern California. In each area the target age group consisted of three to five year olds, which an emphasis on four year olds. Appendix A contains further details on the sampling method, and Table A-1 contains means for the five sample sites for several social and economic variables.

The Sesame data provides some evidence on the size of the bequest of human capital as measured by years of schooling parents desire for their children. Dave (1963) and Wolf (1964) have found that parents' expectations for their child's intellectual status are positively correlated with I.Q. and actual educational attainments. These expectations may be considered a measure of desired bequests and the positive

correlation can be interpreted as one fulfillment of investment plans.

In the Sesame data parents were asked how many years of school they wanted their children to complete as well as how many years they thought the children actually would complete. Table 1 makes clear that these parents have high aspirations for their children. Over the entire sample of four low income areas and one middle income area, the average parent would like 14.6 years of schooling for his child. College graduation was desired by 64 per cent of the parents. The 3.4 years of college middle class parents would have liked exceeded by only 1.2 years the amount of schooling desired by the lower class parents living in a poor section of Boston. Further, there was considerably less variation in schooling demand for children than there was in the actual schooling levels of heads of families (standard deviation of 2.8 for children's schooling, 5.1 for heads). It has been previously shown (Kahl (1953); Hess and Shipman (1965); Lewis (1961)) that working class parents are less likely to expect their children to achieve at the desired level. It is also true in this sample that the parents in urban areas thought their children would actually get 2.1 to 2.2 fewer years than the parents desired, while in suburban areas this difference was 0.8 and 1.5 years respectively. In Section IV it will be shown that desired schooling shows very little relationship to price or income variables. The number of years parents actually expect the children to complete is a more realistic measure. This measure is shown in Section IV to be related to price and income variables. While the amount of schooling parents actually expect their children to achieve is less equally distributed than is desired schooling level, it is still substantially above the parents' own achievements.

Parents with more schooling expected their children to actually obtain more schooling, with the middle class Philadelphia

sample expecting significantly more years than the average, and the three low income, urban areas anticipating significantly lower achievement. Parents, however, foresee that years of schooling will be distributed more equally than in the past, since the range in average schooling levels expected for children is 2-1/2 years, while the education of family heads in the middle class sample exceeds that of family heads in the Durham sample by 6.1 years. It is striking that the aspiration of parents for their children's schooling, as well as their expectation of what will actually occur do not vary across the sample as much as the parents' own achievements.

The parents with the greatest demand for schooling (those in Philadelphia and California) have produced early levels of I.Q. which are higher relative to the mean than their final demand for schooling is relative to its mean. I.Q.'s of the Philadelphia and California samples exceed the mean by .88 and .45 standard deviations respectively while schooling level they expect exceeds the mean by .67 and .19 standard deviations. Similarly, the Durham sample expects final schooling levels .19 standard deviations below the mean, but their children's I.Q.'s at age four are .68 standard deviations below the mean. The parents who demand a larger final bequest have made greater than proportionate bequests in the early ages.[7]

Schooling is a relatively goods-intensive manner of providing a child with an endowment--that is, the value of time inputs from the parents is small relative to the cost of purchased inputs and the value of the child's time. Producing human capital on the pre-school years is an activity requiring large inputs of parental time relative to goods. Because wealthier and more educated parents face a higher price of time, all time-intensive commodities are more costly relative to goods-intensive commodities than for parents

TABLE 1

Mean Bequest desired at Five Sample Sites

	Sample Sites					
	Philadelphia	Rural California	Boston	Phoenix	Durham	All
1. Grade in school parents would like child to complete	15.4**	14.8	14.2	14.5	14.4	14.6
2. Grade in school parents think child actually will complete	14.6**	13.3	12.1*	12.3*	12.3*	12.8
3. Mother's years of schooling	13.1**	11.8*	10.7	9.7*	9.9*	10.9
4. Family head's years of schooling	14.0**	10.8	8.5*	8.0*	7.9*	9.6
5. I.Q.	105.9**	96.4**	85.1	81.2*	71.7*	86.5

Source: Calculated from Sesame data.

Note:

** = significantly above mean for entire sample at five per cent level.
* = significantly below mean for entire sample at five per cent level.

less wealthy or less well educated. Thus one might anticipate that a parents' time intensive element of the bequest would be less highly related to income or parental education than the demand for schooling, since wealthy and better educated parents would substitute away from time-intensive bequests. However, pre-school investments, as measured by I.Q. at age four, are even more highly related to parental education than is the demand for schooling.

Because of the high correlation between I.Q. at age four and 17 we can infer that the better educated parents do not substitute goods-intensive bequests (schooling) for time-intensive bequests (I.Q.). This is consistent with previous work which indicates that more educated mothers, in spite of their higher price of time, spend more time with their children (Leibowitz (1974b) and Stafford and Hill (1974)).

Since I.Q. predicts success in school we can say that children who score higher on I.Q. tests have a higher marginal productivity of time in school. Thus parents would want to increase the kind of human capital which is measured on I.Q. test not only for its own value but because it makes schooling investments more productive. In Part IV, we will show that I.Q. can be interpreted this way in the bequest model. In Part III we will demonstrate that I.Q. at age four is in fact related to inputs of parents' time and goods.

III. The Production of Human Capital in the Home

The model of parental demand for endowments of human capital in their children, assumes that in fact parents have some control over the human capital stock available to their children at the age of emancipation. This assumption is formalized in equation (2), which proposes that the quantity of human capital produced is a function of the inputs of

goods and parental time. Only if parental actions can alter the child's human capital stocks can the parents be considered to be investing in their children. If the child's human capital is unaffected by time inputs by parents, spending time with children may be considered an activity whose availability varies from one period to the next, but which is not fundamentally different from other consumption activities. Thus, the purpose of this section will be to formulate and test a production function for human capital in the home.

Since the focus of the bequest model is the parents' role in developing the human capital of their children, we will look at human capital produced at early ages, before the parental efforts become clouded by the child's efforts to increase or decrease his own stock of human capital. We will determine if parental inputs can be fruitfully interpreted in the context of a production function for intelligence in the child.

1. Empirical Specification of Human Capital Production Function

Table 2 lists variables available in the Sesame data which might be expected to affect childhood I.Q. The first set of variables are measures of time spent in child related activities, which are expected to be positively related to I.Q. X1, X2 and X5 indicate whether it is a usual activity for the mother to play with, read to or watch T.V. with the child when they are together. Holding parental time inputs constant, attendance at a Kindergarten or Head Start Center implies greater adult time inputs to children, and should be positively related to I.Q. While the rationale for Head Start was its development potential, the effect of day care is not clear, since much day care is claimed to be solely custodial (Keyserling). Proxies for the total amount of child related goods present in the home--the presence of dictionaries and encyclopedias--should be positively related to I.Q. Capital goods which are used

TABLE 2

Variables Measuring Inputs to Human Capital Formation

1. Measures of time spent on child related activities Mother's usual activity when child is at home, are dummy variables equal to one if the mother usually engages in the activity with her child.

   x_1 = play with child

   x_2 = read with child

   x_5 = watches T.V. with child

2. Measures of goods for child related activities are dummy variables.

   KINDER = 1 if child attends Kindergarten

   HEADST = 1 if child attends Head Start Program

   DAYCARE = 1 if child attends a Day Care Center

   ENCYC = 1 if family has an encyclopedia

   DICT = 1 if family has a dictionary

3. Measures of parental time spent-adult activities and market work, are dummy variables equal to 1 if the statement is true.

   FULLM = Mother works 35 hours a week or more

   PARTM = Mother works 0-35 hours a week

   FULLF = Father works 35 hours a week or more

   PARTF = Father works 10-35 hours a week

   NOFAT = No father

   FASIZE = Total number of people living in the child's home, a measure of alternative demands on mother's time as well as endowment desired.

   x_4 = when child is home mother usually watches T.V. by herself

   x_6 = when child is home mother usually reads by herself

4. Measures of goods for non-child related activities are dummy variables.

   DRYER = 1 if family has a clothes dryer

   DISHWA = 1 if family has a dishwasher

   COLTV = 1 if family has a Color T.V.

   BWTV = 1 if family has a black and white T.V.

   HIFI = 1 if family has a HiFi

Table 2 (continued)

5. Measures of the quality of parental time are continuous variables:

   EDMOT = highest grade in school completed by mother

   EDHEAD = highest grade in school completed by male head of household

6. Other variables affecting production function

   RACE = 1 if child is black

   SPAN = 1 if child is of Spanish origin

   LANG = 1 if native language is not English

   SEX = 1 if child is male

for nonchild related activities may be labor saving, such as dishwashers, dryers--in which case their net effect is to increase the time available for home investment. But these variables may also be interpreted as proxies for income. To test this hypothesis, we include other capital goods, also positively related to income, which are not labor saving. We hypothesize that the effect of "labor saving" capital goods on H should be more positive than the effect of other capital goods--such as color T.V. or hi-fi.

Time spent in adult consumption or in work is time not spent with children and therefore is expected to be negatively related to I.Q. FULLM and PARTM are dummy variables equal to unity if the mother works full time or part time; FULLF, PARTF and NOFAT are dummy variables which indicate if the father works full time, part time or if there is no father in the home. The dummy variables X4 and X6 indicate that the mother engages in nonchild related activities (watching T.V. and reading by herself) while the child is with her. FASIZE, a measure of the number of other children in the household is also expected to be negatively related to time spent with the child whose human capital stock is being estimated, since the presence of other children in the family increases the MP of parents' time and tends to lead them to allocate less of it to any one child. Although older siblings may spend time with their younger brothers and sisters, since we hypothesize a positive effect of education on H, the net result of more siblings on I.Q. should be negative.

The quality of parental time, as well as its quantity, might affect measured I.Q. Education of the parents is used as a measure of this quality factor. Because we have shown above that mothers are likely to spend more time in child-related activities than fathers, it is expected that mothers' education is more likely to enhance the production of I.Q. and thus to show a larger effect in the regression results. Time

budget studies verify that mothers spend nearly four times as many hours with children as do fathers (Leibowitz (1974b)).

Other variables which may affect I.Q. (or its measurement) in a systematic way are: RACE, SEX, SPAN and LANG, which are defined in Table 2. Age does not affect I.Q., because I.Q. is an age adjusted measure of mental age for a given chronological age. Appendix Tables A and B presents means, standard deviations and simple correlation for the sample.

2. Estimates of the Production Function

Table 3 presents estimates of a linear production function for human capital for the entire sample. In column 1 we see that measures of the quantity of mothers' time inputs to children and other activities support the production interpretation. Family size is a measure of competing demands for the mothers' time, the more children there are, the less time the mother can spend with each child individually. The empirical estimates show that each additional sibling in the family reduces a child's I.Q. by a significant amount. While full-time and part-time work by the mother have a negative effect on a child's I.Q., neither is significantly different from zero.

Capital goods which are labor saving in nonchild oriented activities are expected to be associated with greater time inputs to children, holding other family demands constant. The presence of these capital goods (dryer, dishwasher) is associated in the expected positive direction with I.Q. These capital goods were not merely acting as proxies for income or socio-economic status, since other capital goods which are not labor saving (color television, black and white television or hi-fi) had no significant effect (see column 4).

Previous studies employing time budget data have shown that more educated mothers spend more time with their children (Leibowitz, 1974). Thus mothers' schooling level may represent greater quantity as well as greater quality of time spent with

Table 3

I.Q. as a Function of Family Inputs

Total Sample
N = 805

	1		2		3		4	
Independent Variables	β	t	β	t	β	t	β	t
FASIZE	-.83	2.73	-.73	2.37	-.78	2.54	-.69	2.21
FULLM	-1.30	.74	-.90	.51	-1.33	.72	-.65	.36
PARTM	-.37	.19	.11	.05	-.23	.11	.60	.31
RACE	-14.39	9.29	-14.35	9.27	-14.24	9.10	-13.04	7.31
EDMOT	.67	2.43	.59	2.13	.64	2.31	.48	1.68
ENCYC	5.07	3.84	4.93	3.74	5.05	3.82	4.42	3.28
DRYER	8.17	4.42	7.65	4.14	7.98	4.29	5.31	2.55
DISHWA	6.34	2.97	5.64	2.53	6.00	2.77	3.19	1.40
LANG	-7.74	2.73	-7.23	2.55	-8.05	2.83	-7.21	1.93
EDHEAD	-.01	.08	-.02	.13	-.02	.15	-.08	.53
X_1 = Plays with child			-2.31	1.70			-2.27	1.67
X_2 = Reads with child			3.44	2.35			3.05	2.07
X_5 = Watches T.V. with child			-2.88	1.96			-2.45	1.65
X_6 = Reads by self			2.42	1.30			2.26	1.22
X_4 = Watches T.V. by self			-2.64	1.38			-2.52	1.31
Kindergarten					2.45	1.27		
Headstart					.33	.20		
Day Care					-.25	.11		
Urban							-2.15	.73
Suburb							4.35	1.49
SPAN							1.64	.45
COLTV							1.47	.80
BWTV							-.24	.10
HIFI							1.95	1.16
Intercept	85.45		87.50		85.22		88.49	
R^2	.33		.34		.34		.35	

children. In the estimated production function there is a strong positive relationship between mothers' schooling and their children's I.Q. Because mothers spend much greater amounts of time with young children than do fathers, the effect of mother's education is expected to outweigh the effect of father's, if the relation between parental education and childhood I.Q. is of a production nature. However, if parental education is merely a proxy for genetic stock or family income, the impact of mothers' and fathers' education should be equally strong. The inference of a production relationship is supported by the significant effect of mother's education and the insignificant effect of fathers' education on childhood I.Q. Fathers' work status and absence of father were also not found to be significantly related to early human capital stocks. (Regressions not shown.)

The proxy measure of goods entering the production of human capital (the presence of an encyclopedia), also has a positive effect on I.Q. Race and Lang indicate that black children's I.Q.'s are measured as 13 to 15 points lower than white children's, and children whose native language is not English score almost 7 to 8 points below other children with similar family backgrounds. However, children of Spanish origin (Puerto Rican or Mexican) did not show significantly lower I.Q.'s, once the fact that English was not their native language was taken into account (note the insignificant coefficient on SPAN in column 4). Sex was not significantly related to I.Q.

The mother's education may have a strong positive effect on the child's human capital acquisition either because it affects the quantity of time inputs, or because it affects the quality of time inputs--making all parent-child interactions more productive or because it alters the ways in which time is used. To further investigate the latter possibility, the specific activities mothers reported engaging in while children were

present are entered into the production function. These results are presented in column 2 (Table 3). The activities fall in two classes--those that involve interaction with children, and those that can be defined as adult-consumption.

The variables reflecting time spent with children indicate that how mothers spent time with children may be as important as how much time they spend. Reading with children was the activity which had the greatest effect on measured I.Q. The children of mothers who read score higher I.Q.'s; reading with the child is more productive than reading alone. Children of mothers who watch T.V. while the child is present have lower measured I.Q.'s.[8] Playing with the child was negatively associated with I.Q., even though it represents time spent with children.

Among the inputs of child-oriented purchased services which may affect a child's I.Q. are kindergarten, Head Start and Day Care. Column 3 reports their respective effects on I.Q. While kindergarten was positively related, attendance at a Head Start or Day Care Center had no statistically significant effect. The lack of any effect of Head Start on I.Q. is consistent with the results of studies initiated specifically to evaluate Head Start programs (Westinghouse, 1969).

Since the urban sample contained a substantial proportion of blacks (66%), while the suburban sample contained few (2.4%) and the rural sample none, separate regressions were run for the three sample sites to insure against the race variable acting merely as a proxy for urban residence. (In spite of the fact that a Chow test indicated the hypothesis that the set of coefficients did not differ among the samples could not be rejected at the five per cent level, $F = 1.26$.) Tables 4, 5, and 6 refer to the urban, suburban and rural samples, respectively.

Table 4

I.Q. AS A FUNCTION OF FAMILY INPUTS
URBAN SAMPLE--580 OBSERVATIONS

	1		2		3	
Independent Variables	β	t	β	t	β	t
FASIZE	-.77	2.25	-.70	1.99	-.74	2.14
FULLM	.18	0.10	.21	0.10	-.21	0.10
PARTM	1.08	0.46	1.23	.53	.99	.41
RACE	-13.85	7.84	-13.97	7.79	-13.67	7.66
EDMOT	.40	1.31	.40	1.29	.35	1.13
ENCYC	5.69	3.53	5.33	3.29	5.41	3.34
DRYER	7.62	2.95	7.64	2.95	7.41	2.87
DISHWA	9.33	1.78	8.80	1.67	10.00	1.90
LANG	-7.33	2.41	-6.96	2.28	-8.05	2.62
EDHEAD	-.09	0.52	-0.09	.51	-.09	.53
X_1 = Play with child			-1.85	1.13		
X_2 = Read to child			2.12	1.23		
X_5 = Watch T.V. with child			-1.84	.97		
X_6 = Read by self			3.84	1.53		
X_4 = Watch T.V. by self			-3.59	1.49		
Kindergarten					5.04	1.75
Headstart					1.46	.79
Day Care					.36	.15
Intercept	86.81		88.07		86.38	
R^2	.152		.162		.157	

Table 5

I.Q. AS A FUNCTION OF FAMILY INPUTS
SUBURBAN SAMPLE--166 OBSERVATIONS

	1		2		3	
Independent Variables	β	t	β	t	β	t
FASIZE	-.65	.82	-.91	1.08	-.32	.39
FULLM	9.66	.90	10.43	.97	14.46	1.31
PARTM	-3.38	.80	-3.67	.87	-4.47	1.05
RACE	1.47	.15	1.85	.19	2.06	.21
EDMOT	.95	1.14	1.00	1.19	.60	.66
ENCYC	1.48	.52	1.23	.44	1.28	.45
DRYER	4.33	.79	4.99	.91	4.47	.82
DISHWA	2.83	.98	3.37	1.15	2.78	.95
LANG*						
EDHEAD	.41	.57	.49	.69	.49	.68
X_1 = Play with child					-5.38	1.84
X_2 = Read to child					9.19	2.45
X_5 = Watch T.V. with child					-.52	.18
X_6 = Read by self					-.55	.18
X_4 = Watch T.V. by self					2.43	.62
Kindergarten			-2.92	.96		
Headstart*						
Day Care*						
Intercept	84.64		84.55		82.57	
R^2	.05		.05		.10	

*Note: No children in this subsample had a native language other than English or attended a Head Start Center, or day care.

Table 6

I.Q. AS A FUNCTION OF FAMILY INPUTS
RURAL SAMPLE--59 OBSERVATIONS

	1		2		3	
Independent Variables	β	t	β	t	β	t
FASIZE	-1.24	.97	-1.36	1.09	-1.17	.98
FULLM	-10.96	2.08	-12.34	2.33	-6.39	1.21
PARTM	1.32	.22	2.19	.37	2.27	.41
RACE*						
EDMOT	3.42	2.82	3.58	3.04	3.04	1.93
ENCYC	8.66	2.11	8.15	2.04	9.77	2.50
DRYER	-3.85	.82	-4.40	.97	-3.67	.87
DISHWA	2.53	.48	2.39	.44	2.57	.53
LANG	-2.34	.21	.95	.09	-4.20	.39
EDHEAD	.03	.06	.06	.12	.44	.87
X_1 = Play with child					-1.41	.32
X_2 = Read to child					4.03	.96
X_5 = Watch TV with child					-10.99	2.72
X_6 = Read by self					4.02	.83
X_4 = Watch TV by self					-12.89	2.56
Kindergarten			10.21	2.12		
Headstart			5.64	1.27		
Day Care*						
Intercept	60.94		56.86		74.97	
R^2	.39		.44		.56	

*Note: No children in this subsample attended day care, and none were black.

In the urban sample (Table 4) we still see strong negative race and language effects, but the mothers' education effect is greatly attenuated. Among the time input variables, family size retains its importance, but work status loses its negative impact on I.Q. All the activities mothers engage in seem to affect their children's I.Q. less significantly, perhaps reflecting the fact that these mothers' lower schooling levels cause them to be less productive in all activities. Goods, on the other hand, appear to be even more productive in the urban subsample than in the total sample--as seen in the increased effect of encyclopedia and kindergarten. However, day care and Head Start still show no effect on human capital acquisition.

The only significant predictor of differences in I.Q. within the suburban sample (Table 5) is whether the mother reads to the child. In contrast with the urban sample where race exerted a negative effect on I.Q., black children living in suburban areas scored as high as white children once inputs to the production of human capital are held constant. Perhaps, black families living in suburban areas have moved to those areas because the better schools reduced the cost of providing their greater demand for human capital in the bequest. The measures of goods inputs (encyclopedia, kindergarten) are largely insignificant, due to the fact that these families are well endowed with capital goods. The gross measures of time inputs (work status, dryer, dishwasher) are also not significant predictors of I.Q. However, the specific measures of how time is spent are even more strongly related to human capital, perhaps reflecting the greater productivity of time of more educated mothers.

Table 6 presents regressions for the rural sample. The measures of goods inputs (encyclopedia and kindergarten) are significantly positive in their effect on I.Q. stocks. The

measures of the quantity and quality of time inputs are also significant determinants of human capital stocks. Children of mothers with full-time employment, average I.Q.'s 11 points below children whose mothers have part time or no employment outside the home. When the child care arrangements of the children are taken into account (equation (2)), a 12 point I.Q. deficit is associated with a mother's working full time. However, when the specific activities of the mothers are accounted for (see equation (3)), this deficit is halved, to a six point difference in I.Q.'s. Most of the explanatory power of these activity variables lies in those relating to T.V. watching. Mothers who watch T.V. with their children and "alone" in their children's presence have children with I.Q.'s which average 11 and 13 points respectively below otherwise similar children. The activity variables also act to reduce the coefficient on the mother's education variable, since more educated mothers are more likely to engage in the human capital producing activities (reading) as opposed to the activities associated with lower I.Q.'s (T.V. watching). Thus, we can conclude that the activities mothers share with children affect the children's human capital acquisition as much as the mothers' education or how many hours a day she is home.

In contrast with the urban sample, greater family size is not related to lower human capital stocks. Additional children seem not to affect human capital acquisition in the rural or the suburban sample. Perhaps this is another way in which the marginal cost of (constant quality) children is less outside urban areas.

Summarizing the results of the production function estimation, we can conclude:

1. There is strong support for the production function interpretation, with both goods and time inputs affecting human capital acquisition in the predicted directions.

2. The mother's education was significantly related to the children's human capital, while the father's was not. Variables reflecting father's work status also showed no significant effect on their children's human capital.

3. Full-time work status of the mother is consistently negatively related to I.Q. differences, but in the sample where this effect was strongest (the rural sample), the gross effect of this variable was halved by the inclusion of specific activity variables. In no case was part-time work a significant variable.

4. There appear to be decreasing returns to some goods inputs in the production of human capital, since the effects of kindergarten and encyclopedia are lower in the suburban sample (where the 61 per cent of families has encyclopedias, and 38 per cent of children attended kindergarten) than in the urban and rural samples where respectively nine per cent and 18 per cent of children attended kindergarten and 46 per cent and 43 per cent of families owned encyclopedias.

5. There is evidence that more educated mothers are more productive in all activities, since the effect on human capital outputs of given inputs was greater in the non-urban samples where mothers have more schooling.

6. Non-white children score 13-14 points below white children in I.Q. tests in urban areas, even when other variables are held constant, but did not score

significantly below white children in suburban areas.

7. The specific activities that mothers engage in with children are as important as the gross measures of socio-economic status. In particular, children whose mothers read when they are present develop more human capital than children whose mothers watch T.V. in their presence.

IV. The Bequest Demand and the Derived Demand for Schooling

The parents' desired bequest to children is a useful theoretical construct which is difficult to implement empirically. Even if the total cost of inputs to children's human capital could be estimated, accounting for financial transfers to children would prove difficult. However, it is possible to estimate the derived demand for a bequest input which accounts for a major share of the bequest value. The particular input to be studied here is years of schooling demanded by the parents for their children.

If the bequests parents provide for their children are ordinary economic goods, then their quantity would be expressed to be positively related to income and negatively related to price. The price of the bequest can be measured by the utility of the forgone parental consumption. Assume that adult consumption is subject to decreasing marginal utility, and parents attempt to equalize the size of the bequest to each of their children. Then a given size of bequest is more costly in terms of lost adult consumption to a family with more children (see Becker and Lewis, 1973). Thus, family size may be used as an index of the opportunity cost of the bequest. Family income will be measured by parental education. The derived demand for schooling will depend upon its own price, the prices of other inputs to the bequest, the price of the bequest itself relative to other parental consumption and family income.

The price of schooling varies greatly as does its quality. One useful measure of the cost of schooling is the time required to complete a given number of years of education. Ability can be defined in terms of the time required to learn (Carroll, 1974). Those who learn quickly are said to have high ability (and therefore low "cost" of learning), while those who learn more slowly face higher costs of learning and therefore are said to be less able. In the derived demand for years of schooling, I.Q. will be used as an inverse measure of the cost of acquiring schooling. Since I.Q. predicts best the ability to acquire knowledge in schools, this would seem to be a reasonable interpretation of its effect on schooling. In the context of the family bequest model, I.Q. is then seen as complementary to schooling, since it reduces the cost of additional schooling (i.e., raises the marginal productivity of time in learning), and should have a positive coefficient in the regressions. However, an alternative hypothesis is that I.Q. represents a stock of human capital which is desired for its own sake, and is a substitute for years of schooling. (It would then have a negative coefficient in the regressions.)

A demand equation of the following form is estimated:

$$S = f \text{ (Edmot, Edhead, Fasize, I.Q., Race, Sex)}$$

and the results are represented in Table 7 for the entire sample and for the three subsamples. In the first column, where the dependent variable is the amount of schooling parents actually expect their children to complete, price and income variables are seen to affect the demand for schooling in the expected direction. Both income proxies--education of the mother and father--have the expected positive relationship to the derived demand for schooling, with the mother's schooling exerting a larger and more significant impact on demand than father's schooling. The negative effect of family size confirms that the greater the opportunity cost of the bequest to one child, the smaller the demand for schooling for that child. But the

Table 7

Derived Demand for Schooling

Sample:	Total		Urban	Suburb		Rural
Dependent Variable:	Sactual	Slike	Sactual	Sactual	Sactual	Sactual
Independent Variable:						
Edmot	.30 (8.34)	.28 (7.05)	.25 (6.04)	.30 (3.71)	-.0004 (0)	.25 (1.24)
Edhead	.05 (2.49)	-.02 (1.12)	.03 (1.05)	.13 (1.93)	.14 (2.12)	-.05 (.61)
Fasize	-.06 (1.53)	-.02 (.38)	-.05 (1.09)	-.09 (1.17)	-.10 (1.41)	-.05 (.23)
I.Q.	.01 (3.05)	.006 (1.19)	.01 (1.76)	.001 (.15)	-.001 (.15)	.01 (.55)
Race	-.01 (.05)	.29 (1.31)	.54 (2.27)	-2.93 (3.30)	-2.68 (3.12)	--
Sex	.45 (2.59)	.46 (2.42)	.30 (1.42)	.59 (2.21)	7.27 (3.78)	.86 (1.36)
Girl Ed					.51 (3.51)	
Constant	7.95	10.97	8.46	8.93	6.45	9.62
R^2	.19	.08	.10	.27	.33	.09

lower the cost of acquiring that schooling, the greater the demand, as seen by the significant positive relationship between demand for schooling and early I.Q.[6] While parents desire significantly more schooling for their sons than their daughters (by nearly one-half a year), once price and income factors are held constant, race has no significant impact on demand for schooling measured by actual years parents anticipate their children will achieve.

However, a slightly different picture emerges if the demand for schooling is measured by the amount parents would like their children to have not the amount they expect them actually to get. In column 2, the dependent variable is the number of years parents would like their children to remain in school. In this case the price elasticity of demand is nearly zero, for both the price of the total bequest (measured by family size) and the price of schooling itself (measured by I.Q.). Parents, then, are considering costs when they indicate how much schooling they think their children will actually get, but when they state how much schooling they'd like their children to have, they are abstracting from the costs of schooling. The income effect is also attenuated in this case, but the effect of mother's schooling remains positive and significant. It is apparently not a price or income effect which determines the lower demand for schooling for daughters for parents desire about one half a year less for daughters in both the actual and "costless" cases.

Looking at the demand functions for the subsamples, we see that in each area mother's education is more highly related than father's to the actual years of schooling expected. There is a particularly strong income effect in the suburban sample. While the cost of the total bequest (as measured by family size) is important in all but rural areas, the cost of schooling (measured by I.Q.) is important only in urban areas.

It appeared in all three samples that a smaller schooling bequest was desired for daughters than for sons, with the greatest

"discrimination" occurring in the high income suburban area. However, it is reasonable to expect some interaction between mothers' education and that of daughters. Duncan (1974) documents that mother's education is a significant predictor of daughters' education, while father's education was more closely related to son's education. Therefore, an interaction variable, GIRLED, (which equals the mother's education for girls, zero for boys) was included in the regressions in order to test if more educated mothers demanded more education for their daughters. The total effect of maternal education on demand for daughters schooling will be $(\beta_1 + \beta_2)$ where β_1 is the coefficient on EDMOT and β_2 is the coefficient on GIRLED. The effect on demand of having a college graduate mother rather than a high school graduate mother is calculated for each sample site:

Suburban Sample	+	2.4 years
Urban Sample	+	.2 years
Rural Sample	+	2.0 years

While in the suburban sample college graduates desired 2.4 more years of schooling for their daughters, there was a smaller effect in rural areas, and none at all in urban areas. In suburban areas, the interaction effect completely accounts for the effect of mothers' education on demand for schooling. Mothers with slightly more than two years of college demand equal schooling for their sons and daughters.

Black families in urban areas want significantly more schooling for their children than do white families, while this is not true in suburban areas. However, in urban areas there is less discrimination against daughters in terms of the schooling bequest. For the urban sample, an interaction term reflecting the presence of a black daughter revealed that the greater demand for schooling by black families was due to the fact that these families wanted more schooling for their daughters relative to their sons than did white families.

If parents are efficiently allocating investments among children (that is, equating marginal rates of return) black parents would have less of an incentive to demand more schooling for boys than girls, since black girls can expect higher lifetime labor force participation, thereby raising the profitability of any given investment in schooling. However, the greater relative demand by black families for bequests to their girls did not show up in early investment, since the race-sex interaction had no significant effect on I.Q.

The "cost" of schooling, as measured by I.Q. has a small effect on demand, registering an elasticity at the mean of .07 in the rural and urban sample, and no significant effect at all in the suburban sample. Early human capital thus seems not to be a substitute for schooling, but is weakly complementary to it. However, the cost of the total bequest (as measured by family size) and the income variables affecting total bequest are of greater importance in determining the derived demand for schooling.

We can conclude from this estimation, that the derived demand for schooling shows positive income elasticity and negative price elasticity. Further, the price of schooling itself--as measured by I.Q.--has a stronger effect in the urban sample where the mean I.Q. of the sample is low, than in the rural and suburban samples where sample average I.Q.'s are higher. However, I.Q. shows its greatest effect in the pooled sample. Because early human capital (I.Q.) is a complement to schooling in producing the total bequest, the families with the greatest demand for schooling are the families which have invested most intensively in their children in their pre-school years. And the variance in demand for total bequest is much greater across these samples than within them. In fact, because community schools are the locus of much of the investment in children between the ages of 6 and 18, we would expect parents with similar demands for bequest to congregate. This, however, abstracts from the very real problems that people living in urban areas would have moving to either suburban or rural areas.

V. Summary

In this paper we have developed a theoretical framework in which to consider parents' investment in their children. Ultimately, children may decide to add to or reduce their endowment of human capital by balancing discounted marginal costs and marginal returns. But when they make those decisions in their adulthood, their parents' prior investments will have determined their "initial" conditions. These parental investments as we have seen, are made on the basis of the parents' utility function, and will not necessarily be those that would have maximized the child's lifetime income as seen from the time of birth. Although the parents' investments may not coincide with those that would maximize the child's lifetime income stream, these investments are nonetheless the result of rational processes which are amenable to economic analysis.

We have shown that the demand for a major aspect of the endowment parents bequeath to their children--years of schooling--is related to price and income factors, we have demonstrated that I.Q. measured at age four is a complement to years of schooling in building up the bequest. We have estimated a production function for I.Q. at four which demonstrates that time and goods inputs controlled by parents affect measured I.Q. This is consistent with viewing I.Q. as produced within the home and with viewing I.Q. as a measure of human capital which parents bequeath to their children.

The ability to explain early human capital accumulation and demand for years of schooling supports our hypothesis that parents remain the decision makers--at least until their children are five years old!

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FOOTNOTES

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[1]Extension to the case where there is more than one child involves considerations of economies of scale in raising children, the parental decisions on the optimal number of children and their spacing. These considerations would greatly complicate the model, and will be brought into the empirical work by assuming they are exogenous and merely affect prices faced by the parents.

[2]Schooling outside the home also produces human capital, but with little input of parental time.

[3]Although there appear to be two constraints--money and time, this problem reduces to one of maximization under a single constraint because time is convertible into money at the fixed wage rate W.

[4]This sample is described at length in Appendix A.

[5]An exception is the Terman sample used in Leibowitz (1974).

[6]See Bloom for a summary of these correlations.

[7]It is interesting to note, in view of the low I.Q. scores in the poor, urban areas that only only three per cent of parents responded that their children's actual schooling achievement would fall below their hoped for level due to lack of ability, while 32 per cent said insufficient family finances would cause children to complete fewer years than desired.

[8]The distinction between watching T.V. alone and with the child may not be meaningful, since in neither case is the mother interacting with the child. Interacting with the child while watching a child-oriented program apparently is productive of human capital, since the analysis of the effectiveness of Sesame Street by E.T.S. showed that children who watched Sesame Street with their mothers showed larger knowledge gains than other children. Ball (1970, p. 369).

APPENDIX A

Sample selection for the Sesame data was carried out as follows: In Boston, Durham and Phoenix, areas showing greatest poverty were specified by local officials, and "neighborhoods" around Head Start centers were then defined in these poverty areas. Between 25 per cent and 60 per cent of the sample in each area was composed of children from the Head Start center. The remainder of the sample consisted of all the eligible children (aged three to five) in the designated "neighborhood." This "at-home" sample was located by a house-to-house canvass of the neighborhoods. It is estimated that almost all eligible children in the specified areas were located, and the subsequent cooperation rate was 97 per cent.[1]

In the middle class Philadelphia sample it was relatively difficult to locate pre-schoolers who were not attending nursery school or kindergarten. Thus parents of pre-schoolers who agreed to cooperate were asked to suggest names of other non-enrolled pre-schoolers in their area.

In the rural California sample, 10 school superintendents provided names of pre-school children from poor families in their area.

The initial testing was carried out on 1124 children from five sites. Due to illness and family moves out of the testing area, 17 per cent of the children could not be located for the post-testing. Complete records were, however, obtained for 943 children, who compose samples on whom data were available for the present study. The final sample contained a majority of at-home children, of lower class black children, and of four year olds, as can be seen in Table A. In order to assure comparability across children only the 805 children whose mothers answered the parent questionnaire are included in the present study.

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[1]Ball (1970), p. 21.

APPENDIX TABLE A

Means and Standard Deviations for Sesame Data

	Total Sample N = 805		Urban Sample N = 580		Suburban Sample N = 166		Rural Sample N = 59	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
I.Q.	86.5	21.9	79.9	19.9	105.9	16.7	96.4	16.5
SACTUAL	12.8	2.7	12.2	2.7	14.6	1.9	13.3	2.40
SLIKE	14.6	2.8	14.3	3.0	15.4	2.1	14.8	2.5
EDMOT	10.9	2.9	10.2	2.9	13.2	1.8	11.8	2.0
EDHEAD	9.6	5.1	8.2	4.9	14.1	2.3	10.9	4.6
RACE	.48	0.5	.66	0.5	.02	.15	0	0
FULLM	.19	0.4	.24	0.4	.02	0.1	.17	0.4
PARTM	.13	0.3	.14	0.3	.11	0.3	.12	0.3
ENCYC	.47	0.5	.43	0.5	.61	0.5	.46	0.5
DRYER	.31	0.5	.10	0.3	.92	.3	.58	0.5
DISHWA	.17	0.4	.02	0.1	.60	0.5	.36	0.5
FASIZE	5.38	2.1	5.43	2.3	5.38	1.73	4.9	1.6
LANG	.06	0.2	.08	0.3	0	0	.03	0.2
X1	.64	0.5	.64	0.5	.64	0.5	.66	0.5
X2	.58	0.5	.51	0.5	.78	0.4	.66	0.5
X5	.68	0.5	.75	0.4	.43	0.5	.66	0.5
X6	.17	0.4	.13	0.3	.27	0.4	.22	0.4
X4	.14	0.4	.14	0.3	.15	0.4	.19	0.4
KINDER	.16	0.4	.09	0.3	.38	0.5	.19	0.4
HEADSTAR	.23	0.4	.29	0.5	0	0	.20	0.4
DAYCARE	.11	0.3	.15	0.4	0	0	0	0
SPAN	.07	0.3	.10	0.3	0	0	.05	0.2
COLTV	.22	0.4	.16	0.4	.39	0.5	.32	0.5
BWTV	.88	0.3	.88	0.3	.93	0.2	.73	0.4
HIFI	.76	0.4	.73	0.4	.93	0.3	.66	0.5
SEX	.51	0.5	.51	0.5	.52	0.5	.44	0.5

Source: Calculated from Sesame data.

APPENDIX TABLE B

Matrix of Simple Correlations Sesame Data

	IQ	FASIZE	FULLM	PARTM	EDMCT	RACE	LANG	EDHEAD	SUBURB
IQ	1.00000	-0.08237	-0.12064	0.00923	0.31199	-0.46222	-0.06844	0.28880	0.45255
FASIZE	-0.08237	1.00000	-0.12956	-0.02104	-0.04158	0.02811	0.02753	0.07083	-0.00014
FULLM	-0.12064	-0.12956	1.00000	-0.18712	0.07367	0.21399	0.03738	-0.11985	-0.22131
PARTM	0.00923	-0.02104	-0.18712	1.00000	0.04708	0.04539	-0.05304	0.03731	-0.02595
EDMCT	0.31199	-0.04158	0.07367	0.04708	1.00000	-0.22801	-0.15472	0.50527	0.39936
ENCYC	0.19165	0.10749	-0.00457	0.05417	0.23731	-0.07361	-0.05152	0.18487	0.14927
DRYER	0.44308	-0.02370	-0.16099	0.04362	0.39972	-0.44448	-0.10179	0.42678	0.67953
DISHWA	0.37867	0.02495	-0.12930	0.01337	0.36240	-0.35549	-0.09982	0.36614	0.59652
RACE	-0.46222	0.02811	0.21399	0.04539	-0.22801	1.00000	-0.20276	-0.32017	-0.46462
LANG	-0.06844	0.02753	0.03738	-0.05304	-0.15472	-0.20276	1.00000	-0.12156	-0.12976
EDHEAD	0.28880	0.07083	-0.11985	0.03731	0.50527	-0.32017	-0.12156	1.00000	0.45105
X1	-0.04912	-0.09872	-0.00498	0.01495	0.10972	0.06193	-0.07623	0.10229	-0.00246
X2	0.16357	-0.15620	-0.04531	0.00671	0.27046	-0.03266	-0.12874	0.21044	0.21324
X5	-0.17000	-0.00715	0.07449	0.05783	-0.06171	0.14954	0.04314	-0.10981	-0.26355
X6	0.12214	-0.07136	-0.05241	-0.01622	0.12644	-0.09515	-0.07193	0.11704	0.14316
X4	-0.00915	-0.02433	-0.02338	-0.01200	-0.01513	-0.02944	-0.01485	0.03367	0.01128
KINDER	0.22844	-0.11339	-0.00009	-0.03872	0.23070	-0.24735	0.04559	0.21897	0.30735
HEADSTAR	-0.13148	-0.01458	0.08863	0.04298	-0.07046	0.19134	0.03547	-0.15100	-0.27646
DAYCARE	-0.12884	0.01105	0.25296	0.17210	-0.07168	0.19448	-0.00495	-0.13457	-0.17742
SUBURB	0.45255	-0.00014	-0.22131	-0.02595	0.39936	-0.46462	-0.12976	0.45105	1.00000
URBAN	-0.48236	0.03421	0.20710	0.02970	-0.41092	0.57565	0.13541	-0.44746	-0.81833
SPAN	-0.02670	0.07455	0.06023	-0.08132	-0.19675	-0.26993	0.70591	-0.14543	-0.14334
COLTV	0.20201	-0.03861	-0.00637	-0.03601	0.21181	-0.20444	-0.03341	0.20651	0.21523
BWTV	-0.00747	0.16674	-0.00416	0.06752	0.14908	0.06414	-0.04705	0.05935	0.08802
HIFI	0.16556	-0.04330	0.07973	0.05207	0.34796	-0.02866	-0.12768	0.28095	0.19653
SACTUAL	0.24435	-0.06416	0.03560	0.02438	0.39799	-0.15772	-0.03994	0.28375	0.34032
SLIKE	0.10171	-0.02871	0.04535	0.03432	0.26445	-0.02257	-0.00857	0.10082	0.14179
SEX	-0.00648	0.01291	-0.05033	0.00009	-0.05116	0.01196	0.02124	-0.01915	0.01507