Volume Title: Population and Economic Change in Developing Countries

Volume Author/Editor: Richard A. Easterlin, ed.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-18027-1

Volume URL: http://www.nber.org/books/east80-1

Publication Date: 1980

Chapter Title: Child Costs and Economic Development

Chapter Author: Peter H. Lindert

Chapter URL: http://www.nber.org/chapters/c9663

Chapter pages in book: (p. 5 - 80)

1 Child Costs and Economic Development

Peter H. Lindert

1.1 The Delayed Fertility Transition

Many who are concerned about rapid population growth in developing countries have hoped and expected that economic development would be an effective contraceptive. If it is, then population policy can confine itself to the libertarian stance of subsidizing family-planning propaganda and contraceptive means. While experience has shown that family-planning programs achieve only very modest fertility reductions when large families are desired, the task of reducing desired family size might be left to policies aimed at economic development. By fostering education, industrialization, income growth, and female employment outside the home, general development policies may be a prompt and efficient way to cut fertility. But if economic development fails to bring prompt and sustained fertility reductions, developing countries will have more reason to consider tougher antinatal measures, such as Singapore's stiff birth disincentives of 1972–73 or, beyond them, compulsory sterilization. The social costs of these measures would have to be weighed against the perceived social-insurance benefits of faster fertility reduction as a means of lessening congestion and income inequality.

Peter H. Lindert is Professor of Economics at the University of California at Davis.

The author wishes to thank Michael R. Haines, Allen C. Kelley, Barry M. Popkin, Bryan Boulier, Dov Chernichovsky, and Kathryn E. Walker for their help in making available several sets of survey data for this study. Also gratefully acknowledged is the financial support of the Rockefeller Foundation, the Population Council (with funds from the United States Agency for International Development), the Institute for Research on Poverty at the University of Wisconsin (United States Office of Economic Opportunity), and the University of Wisconsin Graduate School for the earlier United States–related portions of this research.

There is a consensus that economic development *ultimately* prevents births, both by improving the supply of contraceptive means and by raising the perceived costliness of extra children. Ignoring George Stigler's lemma that "there are not ten good reasons for anything," we rattle off long lists of well-known reasons why economic development makes children seem more costly and less of an economic asset.[1] Economic development pulls women out of the home, giving them a greater sense of control over their lives, greater access to contraceptive information, and a heightened sense of the earnings they stand to lose by having children. Economic development pulls older children out of jobs and into school, thus cutting their direct economic contribution to their parents' households. It also raises couples' awareness that social mobility depends on per capita family expenditures that would be dragged down by the arrival of extra children. Their "consumer aspirations" are raised, both by income growth itself and by greater exposure to new luxury goods. This exposure is fostered by the migration from farm to city, by industrialization, and by education. Children become less valuable as insurance of old-age support as the development of asset markets and social security gives parents cheaper ways to assure themselves that support. Greater geographic mobility replaces the extended family with the nuclear family, raising the cost and difficulty of arranging for supplementary child care. Meanwhile, reductions in infant and child mortality cut the number of births necessary to achieve any desired number of surviving children.

The individual arguments linking fertility decline to economic development through child costs are not always well spelled out, or documented, or logically aligned with each other—a shortcoming that will be partly remedied here. But they are at least well agreed upon. Indeed, "economic" as these links may sound to some, their importance in explaining the secular fertility decline is not a subject that divides the disciplines.

Much less resolved is the explanation of the earlier part of the fertility transition that most directly worries antinatal scholars and policy-makers in developing countries today. The secular fertility decline often begins rather late in the "development" or "modernization" process. Just how late depends on how one defines development and modernization.

If the onset of development is signaled by a sustained drop in mortality, then the lag of the fertility decline behind the start of development is often long and highly variable. Figure 1.1 and table 1.1 remind us of this by returning to the varied chronologies of crude birthrates and death rates, the most available proxies for fertility and mortality rates across wide stretches of time and space.

Among the early-developing countries, some had no lag between the onset of death rate decline and that of birthrate decline, whereas others

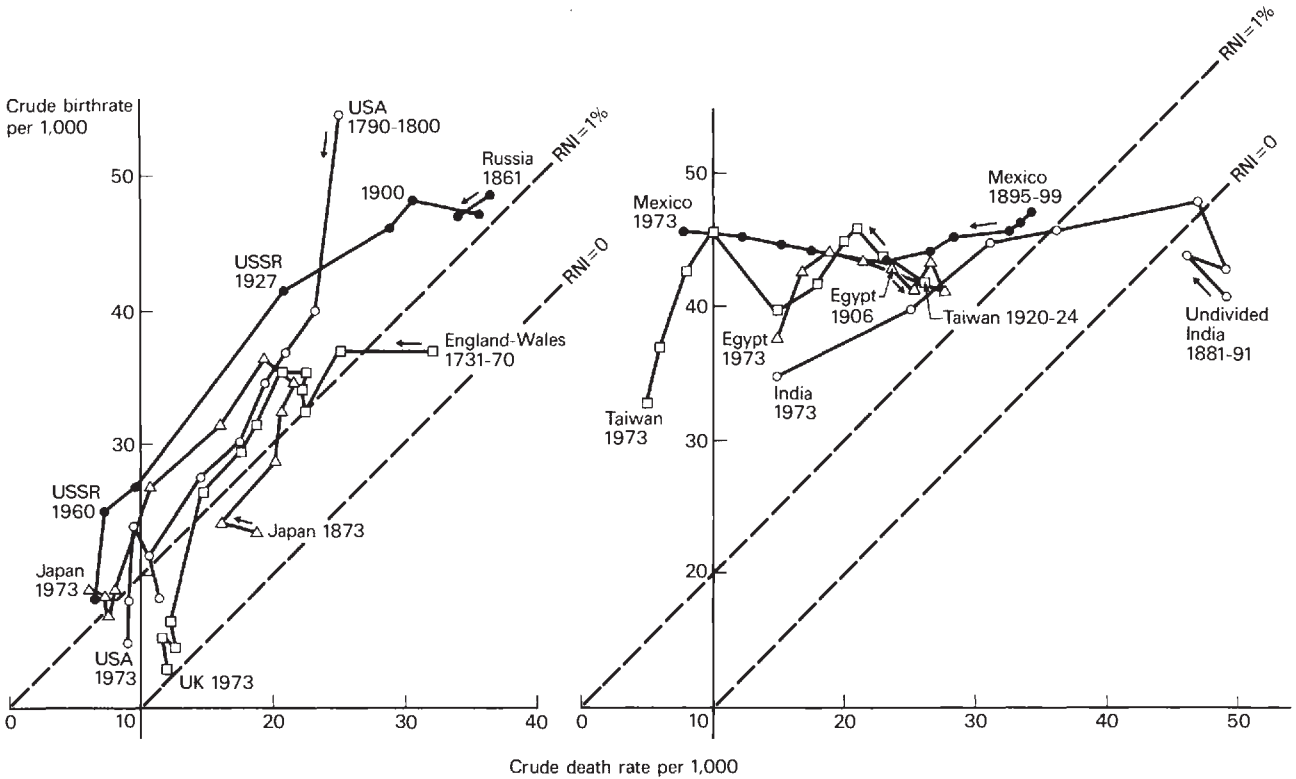

Fig. 1.1 Crude birthrates and death rates in eight countries. Selected peacetime dates.

Table 1.1 **Crude Birthrates and Death Rates in Eight Countries: Selected Peacetime Dates**

Country	Year or period	Crude birth rate/ 1,000	Crude death rate/ 1,000	Source
England/ Wales	1731–70	37	32	Brownlee, via Kuznets 1966, table 2.3
	1781–1820	37	25	Brownlee, via Kuznets 1966, table 2.3
	1841–50	32.6[a]	22.4	Postan and Habakkuk 1965, table 9
	1851–60	34.1[a]	22.2	Postan and Habakkuk 1965, table 9
	1861–70	35.2[a]	22.5	Postan and Habakkuk 1965, table 9
	1876–80	35.3	20.8	Postan and Habakkuk 1965, table 9
	1886–90	31.4	18.9	Postan and Habakkuk 1965, table 9
	1896–1900	29.3	17.7	Postan and Habakkuk 1965, table 9
	1906–10	26.3	14.7	Postan and Habakkuk 1965, table 9
	1926–30	16.7	12.1	Postan and Habakkuk 1965, table 9
	1936–40	14.7	12.5	Postan and Habakkuk 1965, table 9
	1951–55	15.2	11.7	Postan and Habakkuk 1965, table 9
UK	1973	13	12	UN, via Population Reference Bureau 1976
USA	1790–1800	55	25	Grabill et al., via Kuznets 1966, table 2.3
	1870–75	40.8	21.8	Easterlin 1968, p. 189
	1880–85	36.9	21.0	Easterlin 1968, p. 189
	1890–95	34.3	19.5	Easterlin 1968, p. 189
	1900–1905	30.0	17.6	Easterlin 1968, p. 189
	1910–15	27.5	14.7	Easterlin 1968, p. 189
	1925–30	21.5	10.6	Easterlin 1968, p. 189
	1935–40	18.3	11.3	Easterlin 1968, p. 189
	1945–50	24.5	9.9	Easterlin 1968, p. 189
	1955–60	24.6	9.4	Easterlin 1968, p. 189
	1973	15	9	UN, via Population Reference Bureau 1976
Russia[b]	1861	48.8	36.1	Biraben, via Heer 1968, table 1
	1870	47.0	34.0	Biraben, via Heer 1968, table 1
	1880	47.2	34.8	Biraben, via Heer 1968, table 1
	1890	47.2	35.4	Biraben, via Heer 1968, table 1
	1900	48.1	30.2	Biraben, via Heer 1968, table 1
	1910	46.0	28.7	Biraben, via Heer 1968, table 1
USSR	1927	41.6	20.9	Biraben, via Heer 1968, table 1
	1950	26.5	9.6	Biraben, via Heer 1968, table 1
	1960	24.9	7.1	Biraben, via Heer 1968, table 1
	1965	18.5	7.3	Biraben, via Heer 1968, table 1
	1973	18	9	UN, via Population Reference Bureau 1976

[a]Possible underregistration mentioned explicitly by source.
[b]Adjusted to postwar boundaries of USSR.

Table 1.1 (continued)

Country	Year or period	Crude birth rate/ 1,000	Crude death rate/ 1,000	Source
Japan	1873	23.1	18.9	Bank of Japan 1966, pp. 12–13
	1880	24.1	16.5	Bank of Japan 1966, pp. 12–13
	1890	28.7	20.7	Bank of Japan 1966, pp. 12–13
	1900	32.4	20.8	Bank of Japan 1966, pp. 12–13
	1910	34.8	21.6	Bank of Japan 1966, pp. 12–13
	1925	36.3	19.4	Bank of Japan 1966, pp. 12–13
	1940	31.4	16.0	Bank of Japan 1966, pp. 12–13
	1950	26.8	10.5	Bank of Japan 1966, pp. 12–13
	1955	19.0	7.9	Bank of Japan 1966, pp. 12–13
	1960	17.1	7.5	Bank of Japan 1966, pp. 12–13
	1964	18.6	7.3	Bank of Japan 1966, pp. 12–13
	1973	19	6	UN, via Population Reference Bureau 1976
Undivided India	1881–91	49	41	Kingsley Davis, via Postan and Habakkuk 1965, table 16
	1891–1901	46	44	Kingsley Davis, via Postan and Habakkuk 1965, table 16
	1901–11	49	43	Kingsley Davis, via Postan and Habakkuk 1965, table 16
	1911–21	48	47	Kingsley Davis, via Postan and Habakkuk 1965, table 16
	1921–31	46	36	Kingsley Davis, via Postan and Habakkuk 1965, table 16
	1931–41	45	31	Kingsley Davis, via Postan and Habakkuk 1965, table 16
Independent India	1950–55	40	25	UN, via Postan and Habakkuk, table 16
	1973	35	15	UN, via Population Reference Bureau 1976
Mexico	1895–99	47.3	34.4	Collver 1965, table 41
	1900–04	46.5	33.4	Collver 1965, table 41
	1905–09	46.0	32.9	Collver 1965, table 41
	1920–24	45.3	28.4	Collver 1965, table 41
	1925–29	44.3	26.7	Collver 1965, table 41
	1935–39	43.5	23.5	Collver 1965, table 41
	1940–44	43.8	21.8	Collver 1965, table 41
	1945–49	44.5	17.8	Collver 1965, table 41
	1950–54	45.0	15.4	Collver 1965, table 41
	1955–59	45.8	12.5	Collver 1965, table 41
	1973	46	8	UN, via Population Reference Bureau 1976
Egypt	1906	43.2	23.6	Nassef 1970, table D.2
	1913	41.6	25.4	Nassef 1970, table D.2

Table 1.1 (continued)

Country	Year or period	Crude birth rate/ 1,000	Crude death rate/ 1,000	Source
Egypt (*cont.*)	1925	43.5	26.5	Nassef 1970, table D.2
	1935	41.3	26.4	Nassef 1970, table D.2
	1950	44.2	19.0	Nassef 1970, table D.2
	1960	42.9	16.9	Nassef 1970, table D.2
	1973	38	15	UN, via Population Reference Bureau 1976
Taiwan	1920–24	42	26	Gille 1967, table 1; UN (1973), table V.4
	1925–29	44	23	Gille 1967, table 1; UN (1973), table V.4
	1930–34	46	21	Gille 1967, table 1; UN (1973), table V.4
	1935–39	45	20	Gille 1967, table 1; UN (1973), table V.4
	1940–44	42	18	Gille 1967, table 1; UN (1973), table V.4
	1945–49	40	15	Gille 1967, table 1; UN (1973), table V.4
	1950–54	46	10	Gille 1967, table 1; UN (1973), table V.4
	1955–59	43	8	Gille 1967, table 1; UN (1973), table V.4
	1960–64	37.2	6	Gille 1967, table 1; UN (1973), table V.4
	1973	23	5	UN, via Population Reference Bureau 1976

had long lags. In some cases the fact that birthrates were already declining when death rates began their sustained descent can be attributed to frontier conditions that made fertility higher at the outset than it was as settlement proceeded. An early frontier stimulus to fertility may help explain why birthrates were already falling from high levels by the time death rates began their decline in the United States, Canada, Argentina, Chile, Australia, New Zealand, and the Russian empire. Less obvious are the reasons why France was already experiencing declining fertility by the late eighteenth century, before or contemporaneous with the sustained improvement in life expectancy.

In sharp contrast, other early developers appear to have had prolonged periods in which the fall in death rates was not matched by a fall in birthrates. As shown in figure 1.1 and table 1.1, England and Wales were in this transitional position between the late eighteenth century[2]

and the 1870s. The lag in fertility decline was at least as long in Japan, where birthrates began to fall slightly only after 1925 and did not drop much until after the defeat of 1945. Japanese experience deserves considerable attention in any overview of the transition. It appears that even with some allowance for early underregistration of births and infant deaths, birthrates and death rates were both below 30 per thousand from the mid-eighteenth century to the early Meiji era.[3] Across the Meiji and Taisho eras (1868–1925), the birthrate rose noticeably while the death rate either rose slightly or fell slightly, depending on the extent of early underregistration. Japan thus experienced either a prolonged period of high fertility with declining birthrates or a prolonged period of rising fertility with stable or slightly rising death rates, depending again on the extent to which births and deaths were underregistered together in earlier eras. There was also a noticeable lag of the secular fertility decline behind the fall in death rates in Denmark, Norway, and Sweden, where death rates dropped from the mid-eighteenth century and birthrates did not fall significantly until the 1860s or later. Germany also experienced stable birthrates and falling death rates across the period from the 1860s to about 1900.[4]

A lag of fertility decline behind mortality decline is much more common among recently developing nations and has generated higher rates of natural increase than ever prevailed in the transition period for England, Japan, or the Scandinavian countries. Figure 1.1 and table 1.1 review this point for four recently developing countries. Across the interwar period, British India experienced rapid reductions in death rate without any downward trend in the birthrate. Only since independence has India had declining birthrates, and the decline has not been large enough to halt the rise in the rate of natural increase. The same experience was shared by Egypt, whose birthrates failed to decline before the Nasser coup and have declined only slightly since. Taiwan also cut its death rate without cutting births between the 1920s and the early 1950s, though Taiwan has achieved impressive birthrate reductions in the postwar era since the flood of immigrants arrived from mainland China. The most dramatic holdout among those countries in figure 1.1 is Mexico, whose birthrates have not dropped over three-quarters of a century of declining peacetime mortality. Developing countries cannot find any prompt or predictable response of birthrates to death rates in this array of national experiences.

If the onset of development is marked by an accelerated rise in literacy rates or a trend toward urbanization and industrialization, the same picture emerges as with the birthrate/death rate comparison. All the settings in which death rates were declining were ones of rising literacy, school attendance, urbanization, and industrialization. Defining development in terms of these changes merely reestablishes that the modern

periods of declining mortality without reductions in birthrates were also periods when "development" was occurring without cutting birthrates in the aggregate.[5]

Defining the onset of development as the turning point at which national product per capita began a sustained rise reduces, but does not eliminate, the cases of nonfalling birthrates accompanying development. In England and Wales, product per capita, like the other development indicators, rose from the mid-eighteenth century to the delayed downturn in birthrates in the early 1880s.[6] The length of this transition period would be reduced, however, if we had data on the income progress of the lower-income, higher-fertility groups: real wage rates, with or without allowing for shifts in the occupational structure, probably did not begin a sustained ascent until about 1815.[7] The period when development by all measures touched most segments of English society without bringing a drop in the aggregate birthrate might thus have been as short as 1815–80—but this is still a long transition period. Using the product-per-capita and real-wage yardsticks does not shorten the transition period for Japan, since both indicators were rising over most of the period 1873–1925.[8] There was probably also an extended period in the nineteenth century when by any yardstick economic development was proceeding in Denmark, Norway, and Sweden without a decline in the crude birthrate, but there are not enough pre-1860 data on product per capita and real wage rates for a more positive statement. At any rate, among the early developers there are some clear cases of birthrate decline lagging far behind any measure of economic development, whereas no lag at all occurred in other cases.

Among more recently developing countries, using the product-per-capita or wage yardsticks does narrow the range of experiences involving development without birthrate declines. In particular, these yardsticks separate out the cases of India and Egypt. Product per capita did not begin a sustained rise in India until independence,[9] a quarter-century after the beginning of the decline in crude death rates. Similarly, neither agricultural product per person nor real agricultural wage rates rose in Egypt from the turn of the century to 1940.[10] Only after midcentury did product per capita and real wage rates drift upward in both India and Egypt—and only in this same recent period did birthrates begin a gradual decline. As far as India and Egypt are concerned, properly including real income growth in the definition of development eliminates the transitional phase: birthrates declined when true development began.

Yet other recently developing countries have still had the transitional phase, violating any simple prediction that development means fertility decline. Taiwan apparently had rising average incomes as well as rising literacy for two or three decades before World War II and before the onset of the fertility decline in the 1950s. Several countries in Latin

America and the Caribbean have also had development without declining birthrates. Specifically, since the early 1950s the following twelve countries had birthrates above 30 per 1,000 and not falling faster than half a point a year, while also having growth rates in GNP per capita above 1% a year as well as rising literacy and urbanization: Brazil, Colombia, Dominican Republic, Ecuador, Guatemala, Honduras, Jamaica (to 1969), Mexico, Nicaragua, Panama, Peru, and Venezuela.[11]

1.2 Three Views of the Lag in Fertility Decline

Both the frequent occurrence and the high variance of the lag of fertility decline behind development pose serious empirical problems for any integrated theory relating fertility to modernization. If we are to know what governs the timing of the start of the eventual fertility decline, our knowledge must be based on a model consistent with the lag and its variations across social groups and nations, as well as with the eventual decline. There are at least three theories of the lag in fertility decline that incorporate a submodel designed to explain why fertility does drop later on.

The first interpretation of high fertility during early development posits a *threshold of economic consciousness*; before this point, attitudinal inertia prevents any conscious individual control of family size. According to this view, which is a vague presence in the relevant literaature rather than an explicit contender, couples do not regulate their fertility except in conforming to traditional rules regarding marriage, intercourse, and breast-feeding. The early diffusion of modern values has little influence on family formation practices, perhaps even among those becoming literate, urbanized, and more prosperous. Whether children are becoming more or less costly or valuable is irrelevant simply because it is not perceived. Only after the development process has passed some threshold do couples think of the costs and benefits of children as something that should affect their behavior, and by this time children are in fact becoming more costly, more of an impediment to the attainment of the new aspirations. This view contains no obvious way of predicting which groups or societies will take longer to reach the threshold of economic consciousness, except possibly by juggling the definition of development so that the same threshold matches the onset of falling fertility in all cases. It also seems to conflict with other evidence that even in traditional societies families respond to economic opportunities and even view children largely in economic terms. It is, however, one not implausible way of explaining the sometime lag in fertility decline, one that has not been refuted by any conclusive test.

The second interpretation of the sometime lag has been incorporated in a recent model of demographic development by Riad Tabbarah and

Richard Easterlin.[12] This model identifies a threshold at which fertility switches from being determined by the *supply of children* (or the "potential output of children") to being driven downward by the declining demand for children. On this interpretation *Homo economicus* is not born after development has advanced to the threshold. He (and she) already exists in traditional society and in the early phase of modernization as well. In these early settings, however, couples see children as beneficial enough so that they want a larger family than they can achieve. The perceived benefits are not spelled out as economic or noneconomic, but the early constraints on fertility and completed family size are viewed as definitely social and biological. Couples' fertility is, as in the first interpretation, constrained by social codes governing marriage, intercourse, and breast-feeding, and by their fecundity. Within these constraints they leave fertility "unregulated" in order to have as many children as possible, "as many as God wills."

The dawn of economic development raises fertility, in this model,[13] at the same time that it cuts the optimal number of children. Better living standards raise natality by raising fecundity and possibly by relaxing some of the social restrictions on marriage. Development further raises the probability that children will survive to adulthood, causing completed family sizes to rise faster than fertility. Yet, at the same time, economic development is also pulling the desired number of children down toward the attainable maximum, presumably through the same socioeconomic mechanisms that bring the secular fertility decline later on. The threshold arrives when the desired number of children drops below the attainable number, or when couples perceive this and begin to bring unwanted births under individual control.

It is possible to conduct a partial test of the underlying assumption that the supply of children falls below the desired number in the era before the onset of fertility decline. The partial test consists of calculating the actual average net economic benefits or costs of an extra child at the average completed family size. If it turns out that an extra child brings a net economic cost in this setting, supporters of the supply-of-children view would be compelled to assert and show either that extra children would have been of overriding net benefit on noneconomic grounds or that couples' perceptions were biased toward greater appreciation of child benefits than of child costs. If, on the other hand, it turns out that extra children would have brought net economic gains to their parents, critics of the supply-of-children view would have to fall back to the shakier position that children brought an overriding net noneconomic cost or that couples perceived economic costs more fully than they perceived economic benefits. No such test has ever been conducted, though preliminary tests are sketched below. Such tests aside, it can be agreed that this hypothesis is at least partly correct in focusing

on basic fecundity and social mores as fertility determinants in the early phases of development.

I will argue that the evidence makes room for a third interpretation of the delayed fertility transition, one arguing that the *relative costs of extra children* at given parity may not rise until well into the development process. It may be that the average desired number of surviving children was never above the potential number. It may be that fertility and child survival were widely "regulated" all along by society and by individual couples through the traditional crude devices—postponement of marriage, abstinence, withdrawal, and, in some societies, induced abortion and infanticide. Perhaps succeeding generations of couples were always vaguely aware of the economic consequences of child-rearing and were not given strong new incentives to prevent births until well into the development process. Neither the available evidence on patterns of birth timing, nor that on stated social norms, nor that on child costs and benefits yet allows us to reject this view.

This interpretation has not been given the empirical tests it deserves, partly because the relative cost concept has not been operationally defined and partly because sufficient data have not been gathered on the economic role of children within households in developing countries. In the next section I shall define a measure of the relative cost of extra children that embodies most of our theoretical intuitions about how changes in the economy affect couples' choices between extra children and other acquisitions. The measure is next quantified in detail and applied to aggregate twentieth-century patterns in United States fertility. Subsequent sections survey some empirical evidence on child-cost patterns in developing countries. It turns out that the relative-child-cost interpretation escapes rejection in some crude initial tests and poses again some puzzles that are already before us. Beyond the slight support given to this interpretation of the delay in fertility transition, the measure of relative child cost offers a theoretically convenient, and often empirically workable, way of bringing order to a host of previously disorderly arguments about how child costs evolve with economic development.

Let me stress in advance that the sections that follow pose only very crude tests of the importance of relative-child-cost movements, and that even these limited tests caution against the belief that movements in relative costs explain all of the most interesting aggregate fertility patterns. To test the influence of the relative-child-cost measure, one should place the measure into direct competition with other socioeconomic and demographic variables in regressions explaining parts of observed fertility patterns. That kind of test has been performed only for the twentieth-century United States, not for the earlier development contexts that are of prime concern here. The usefulness of the relative-cost measure, and

its more available proxies, in accounting for the frequent occurrence of a lag in the fertility decline is subjected only to a rough test of raw correlation. It more or less passes this rough test by showing good reasons why the relative cost of an extra child is likely not to have risen in many early-development settings, yet has surely risen much later on.

Even these limited tests—a few regressions for the United States and a looser documentation of the correlation between likely relative-cost movements and fertility trends in developing countries—seem to limit the explanatory power of arguments about movements in child costs. Movements in relative child costs cannot explain away all of the cross-sectional fertility patterns in twentieth-century America. Nor can they account for the postwar baby boom and bust, though they play a partial role. Nor do they pass all the simple tests of raw correlation in the experience of developing countries: they cannot, for example, explain why fertility has begun to decline somewhat in Egypt and India but not in Mexico.

It appears that, when this measure is polished up and given its chance, we will still have to divide our explanations of the most important fertility patterns over time and across socioeconomic groups among these categories of contributing forces: (1) patterns in relative child costs; (2) patterns in the relationship of couples' current income prospects to their prior living standards, a force that can be viewed either as a proxy for their information costs about different life-styles and modes of child-rearing or more simply as a parameter of their tastes regarding inputs per family member; (3) other taste variables; (4) differences in the supply of the means of contraception; and (5) differences in fecundity. The relative-child-cost measure does not promise a monocausal explanation of fertility patterns; it only offers a way to organize the standard vague economic arguments linking secular fertility decline with modernization and to supplement these with a method of accounting for some of the absence of fertility decline in many early-development settings.

1.3 The Concept of Relative Child Cost

1.3.1 Basic Features

Rich as our intuitions are about how changes in the economic environment affect couples' natality incentives, our progress toward converting these intuitive arguments into a manageable and measurable concept has been surprisingly slow. Calculations have been made of the absolute dollar costs and benefits of an extra child. Recently these calculations have been sharpened to include time costs and, in some cases, to be appropriately specific to different birth orders and parental incomes, especially in the United States.[14] The arguments about child

costs and economic development are often stated as assertions that changes in the economy drive up a child's absolute net cost to his parents. Yet this is an awkward way of discussing child costs for the purposes of analyzing fertility behavior. If a concept of child cost is to be usable as part of a choice-theoretic framework for analyzing controlled fertility, it must at least separate out price influences in the couples' environment from influences stemming proximately from their tastes and incomes. Treating child costs as an absolute net dollar magnitude fails to meet this standard, even though knowing the absolute magnitude has other uses. Even if there were no change in the price signals couples receive from the economic environment, improvements in their income prospects alone would affect the amounts they spent on each child. Shifts in tastes would do the same. When people's incomes go up at fixed prices of time and commodities, leading them to spend more on each child, we say that they can afford higher-input children. We do not say that the "costs" of children have risen in this case, any more than the higher food expenditures of the rich mean that food "costs" the rich more. Similarly, if couples' tastes shift toward higher inputs of time and commodities per family member with given income, referring to this as a shift that raises the "cost" of a child threatens to confuse taste effects with couples' responses to changes in the prices they face when trading with the outside world.

Thus, if needed repairs are to be made to the vague economic concept of child costs, the first step answers the question, Costs of *what kind* of child? For the cost concept to focus on the effect of changing prices that couples face, it must be an index of the cost of one particular set of time and commodity inputs, one characteristic of a relevant birth order, child life expectancy, parental income level, and so forth. It is more workable when defined as an input price index, not as a measure of net economic value or of psychic cost or value.

A second step is to resolve the question, Cost to whom? Since the concept is being developed to analyze private fertility behavior, an index of the costs facing young couples will be pursued rather than an index of the costs to society. To limit the task of the present paper, I will focus more narrowly on the private child costs facing young married couples over the rest of their lives. No discussion will be given to the possible domination of husband or wife in marital fertility decision-making or to the decisions of unmarried couples regarding intercourse and marriage, though changes in child costs might even have an effect on these premarital decisions.

The final question to be faced in deciding on the basic features of a workable child-cost measure is, Cost relative to what? The arguments about the evolution of child costs presume that this evolution affects fertility decision-making within a context of household choice, analogous

to the models of consumer choice that derive demand functions from taste, relative prices, and an income constraint. For this analogy to retain its value it is essential that the price concept be one of relative price, again not one of absolute value of expenditures. The relative cost of an extra child can be said to change only if exogenous changes in the prices of goods and services change the ratio of the input price of a child to the input price of the bundle of activities with which an extra child competes. And it is with some other activities, not with "goods" or "commodities," that children compete. Parents' enjoyment of children is a home activity, an output, produced with both time and commodity inputs, competing with other activities using time and commodities. An extra child competes for couples' time and commodity resources with the further development of parents' enjoyment of already-born children and with activities not related to children.

1.3.2 The Relative-Cost Formula

These basic considerations lead to a formula for the relative cost of an extra child, a ratio of price indexes that fits into any of several household optimization models, even ones in which couples choose fertility regulation strategies rather than childbirth outcomes.[15] The first price index is an index of the prices of the inputs that go into an Nth family member in a family of given potential income. It is based on the absolute discounted cost of a child's inputs at the expense of his parents' household, net of the child's economic contribution, over the parents' entire expected lifetime in some base period.[16] The absolute cost of the child in the base period is:

(1)
$$\text{Cost}_N = \sum_{t=0}^{T} \frac{\left[\sum_{n=1}^{N} s_t w_{nt} L^N{}_{nt} + \sum_{j=1}^{J} s_t p_{jt} C^N{}_{jt} \right]}{(1+r)^{t+1}},$$

where T = the number of years until the couple's lifetime planning horizon;

s_t = the probability that the child will survive (and remain in the parents' household) to age t;

w_n = the after-tax dollar wage rate of the nth family member, valued at the rate being earned by workers with that member's attributes at the time of decision;[17]

$L^N{}_{nt}$ = the nth family member's time input into the extra child in the tth year, for $n = 0, \ldots, N-1$; for $n = N$, L^N equals *minus* the work time contributed by the Nth family member while still within the household, either at paid work or at household chores that would have to have been performed whether or not this extra child existed;

C^N_{jt} = the input of the jth commodity into the extra child in the tth year; for the years after the child has left the home, this set of variables reflects the net flow of transfers from parents to child (parents' gifts and bequests minus support by this child's family);

p_j = its price, at the decision time one year before birth of the Nth family member; and

r = the rate of discount, discussed below.

The related concept of the absolute cost of a *surviving* child equals this same formula with all the survival probabilities, the s_t's, set at unity.

Note that this absolute input cost is measured net of the child's own economic contribution to his parents' household and is not a gross measure of inputs as would be more appropriate for studies of the formation of human capital in children. While the extra child is still a member of his parents' household, his contributions of time for paid work and for chores that would have to be done with or without him are to be subtracted from the time other family members devote to him, in order to arrive at an estimate for the net time input into him. His earnings at paid work must also be included in the income of the expanded family when deducing the effect of the extra child on the family's commodity consumption. His earnings are implicitly viewed as a substitute for the same value of earnings on the part of other family members, as though they are permitted to work less for the same total commodity consumption if he exists. If his contribution to his parents' household turns out to outweigh the gross discounted cost of his inputs, then of course the formula yields the child's asset value (times minus one) if the discount rate is the appropriate rate of return on alternative assets.

Since our present interest is in using this absolute cost formula as part of a price-ratio index, let us define a cost index of these same child inputs as

$$P_N = \sum_{i=1}^{N+J} c_i p_i \qquad (\Sigma c_i = 1.00), \tag{2}$$

where P_N is the index of child input cost,

p_i is the price index for the ith child input, whether the time of a family member or one of the J commodity classes, and

c_i is the share of the ith input in total cost in the base period.

The base period can be a fixed one, as in the 1960-based index used below. A somewhat better alternative is to use a divisia index as a way of allowing the share weights in the inputs to vary across temporal and spatial comparisons. Adjusting the weights as frequently as possible is

especially desirable in view of the systematic shifts in relative weights during the development process, to be documented further below.

The next task is to set up a similar input price index, P_H, for the inputs going into the "alternative bundle," the extra enjoyment of various home activities without the extra child. At the level of any one family, it would be impossible to observe both this alternative bundle and the bundle of inputs going into the extra child. If the family has the extra child, we cannot observe the alternative bundle, the time and commodity inputs they would have devoted to extra travel, living room furniture, landownership, and so forth without the child. If they do not have the extra child, we cannot observe the inputs of time and commodities into that child. Estimating the impact of an extra child on the family's time and commodity allocation, like any other estimation of impacts or effects or causes, involves a counterfactual comparison.

To observe the alternative bundle for comparison with the child input bundle, use is made of a standard assumption of cross-sectional analysis. It is assumed that any couple that in fact had, say, a third child would have followed the same time path of time and commodity inputs over the (cross-sectionally derived) life cycle as do (two-child) couples with all the same attributes except for having a third child. In theoretical terms, this amounts to assuming that the constrained two-child and three-child optima being compared by the two-child couple in its decision-making about fertility regulation correspond to the time paths revealed for couples like them (in schooling, age, race, residence, etc.) having two and three children.

Using this cross-sectional assumption, it is in fact possible to reveal the time and commodity inputs in the alternative bundle by estimating all the effects of the extra child on the household's "foreign trade and payments"—its imports of goods and services, its exports of labor services and home-produced goods, and its net savings.

An extra child will raise some commodity imports into the home and lower others. Imports are raised for those goods used more in child-rearing than in other home activities. As we shall see below, rearing an extra child raises food imports considerably, has a smaller effect on imports of clothing and shelter, and greatly reduces imports of other commodities. Knowing these import effects allows us to reveal the commodity inputs into the alternative bundle. Using the superscript H for the whole set of activities that are the alternative to having the extra child, we can express the following identity for each year t

Value of the ith input taken away from other home activities by having the extra child	$\equiv$	Value of the ith input devoted to raising the child	$-$	Increase in imports of the ith input caused by having the extra child

in terms of symbols as follows:

$$(3) \qquad -C^H{}_i \equiv C^N{}_i - (C^H{}_i + C^N{}_i).$$

The term on the left side can be revealed by estimating the items on the right. The $C^N{}_i$ values are estimated by studies trying to quantify the commodity inputs into individual children. The net import effects can be derived from household expenditure surveys showing the variation of family expenditures with the number of children for comparable income and age classes. The resulting figures for the $C^H{}_i$'s can be cross-checked for plausibility against independent estimates of income elasticities of expenditure.

In calculating the effects of a child on the family's commodity imports, considerable care must be taken to specify correctly the income the family would have without the child. One cannot simply compare consumption patterns of families with the same income and different family size, since family size affects income, both through hours worked and through wage rates. The arrival of an extra child is often accompanied by an immediate reduction in family income, since the wife often drops out of the labor force. Further family income losses result because the wife's job is interrupted when the baby arrives. The reduction in her job experience means that she will tend to receive a lower hourly wage than if she had not had the child. This job-interruption effect on her wage rate, like the loss of work hours, lowers the family's income. Partly offsetting these losses of the wife's income is the net increment to the father's income: fathers tend to work slightly longer hours to support their larger families.[18] All these effects on the family's labor export earnings must be taken into account in deriving estimates of the family's commodities with and without the extra child. The two bundles thus involve different time paths of household income.

The time taken away from other home activities each year by an extra child can be estimated by using another identity. For any nth family member other than the extra child, the fact that total living hours per year are fixed means:

$$(4) \qquad L^N{}_{nt} + L^H{}_{nt} + \Delta L_{nt} = = \Delta \bar{L}_{nt} = 0,$$

where the N superscript is for inputs of time into the Nth family member, the H is for activities that are alternatives to having another child, the L's without superscripts are time spent working for pay in the labor force, and the bar is for total available time. The value of home time taken from other home activities during the year t $(-L^H{}_{nt})$ can be derived by subtracting any reduction in labor exports from the estimate of the time put into the extra child $(L^N{}_{nt})$. The reduction in labor time exports can be estimated from studies of labor force participation, and the time spent on an extra child can be estimated from time-use studies.

In this way figures can be derived for all the inputs, both time and commodity, into the alternative activities. The absolute cost of the alternative bundle of inputs can then be measured by the formula:

$$\text{Cost}_H = \sum_{t=0} \frac{\left[\sum_{n=1}^{N-1} w_{nt}L^H{}_{nt} + \sum_{j=1}^{J} p_j C^H{}_{jt}\right]}{(1+r)^{t+1}}. \tag{5}$$

The discounted values of the two bundles are not necessarily equal. They will differ by the effects of the extra child on the family's total earning potential (for given labor-force participation rates), the effects of the child on the parents' taxes (in particular, the tax exemption per dependent), and a technical discrepancy arising from any difference between the discount rate and the rate of return earned on the parents' savings, which shift resources between time periods.

The index-number counterpart to cost_H, or the index of the prices of inputs into the alternative activities with which the extra child is revealed to be competing, is

$$P_H = \sum_{i=1.00}^{N+J} d_i p_i \left(\sum_{i=1}^{N+J} d_i = 1.00\right), \tag{6}$$

where P_H is the index of absolute cost of the alternative to having another child, p_i is defined as before, and d_i is the share of the ith input in the total cost of the H bundle in the base period.

Now that we have defined indexes for the input costs of the two alternatives to be compared, the definition of the *relative cost index* for an extra child is simply

$$P_C = P_N/P_H. \tag{7}$$

Since P_C is a *relative* price index, we need be concerned only with the *differences* in the shares of each input in the two component indexes. It can be shown that the effect of a given percentage movement in the price (or wage) of one home input yields a percentage change in the relative cost of an extra child governed only by the difference in the shares of that input in the numerator and denominator bundles of inputs:

$$\left(\frac{\Delta P_c}{P_c}\right) \approx \sum_{i=1}^{N+J} \left(\frac{\Delta P_i}{P_i}\right) \times (c_i - d_i). \tag{8}$$

This is a useful simplification of the formula. It means that the magnitudes crucial to the behavior of the relative cost index are the net effects of an extra child on family members' paid work and the household's total consumption of various classes of commodities, represented by the term $(c_i - d_i)$. These effects on the household's foreign trade patterns are easier to estimate than the actual child inputs, which require consid-

erable assumptions about how time and commodities are divided up within the home. The fact that only differences in the shares make the index respond to relative input price movements further means that the weight differences (again, the $c_i - d_i$ terms) do not obsolesce so rapidly as households' incomes grow. Income growth will raise the quantities of commodities going into a child of given parity, but it will also raise the quantities going into the activities with which children compete, leaving smaller net effects on the weight differences. It will turn out below that just a few shifts in weight differences seem to occur with the process of economic development and income growth, making the relative cost index move in accordance with a few key movements in relative prices and weight shifts.

In the event that children turn out to be a net economic asset in the base period, the formula would have to be modified slightly. In this situation, the appropriate measure would be an index ratio relating to the returns from, and the gross inputs into, an extra child. In the numerator would be an index of the prices of the goods and services delivered by the child to the parents' household, and in the denominator would be a price index of the gross inputs into the child. Movements in wages and price would affect this benefit-cost index.

It is worth pausing to reflect on how this concept would be aligned with the more common household-production frameworks recently used to develop models of fertility behavior. Within such frameworks the household budget constraint is often put in nonlinear form. Abstracting from the specific stage of the life cycle, this budget constraint is something like:

$$I = p_z z + p_q q n, \tag{9}$$

where I is the household's total potential income, p_z is an index vector of the prices of inputs into the parents' child-unrelated activities (smoking, adult entertainment, etc.), z is a vector of the amounts of these child-unrelated inputs, p_q is an index vector of the prices of inputs into the children, q is a vector of the average level of inputs per child, and n is the number of children.[19] Abstracting further from the effect of an extra child on income potential itself and from distinctions between current children and surviving children, it is clear that the relative cost of an extra child, the Nth child is

$$P_C = \frac{q p_q}{p_q (N-1)(\Delta q) + p_z (\Delta z)}, \tag{10}$$

where the average inputs level in the numerator (q) is evaluated in the situation with the extra child and the changes in q and z are caused by the need to fit the extra child into the budget constraint. This expression becomes the overall scalar index of relative child cost by letting the p's

vary and using the remaining expressions to define the base-period budget weights.

The input price index in the denominator of expressions 7 and 10 is a weighted average of the prices of inputs into extra child-unrelated activities and the prices of inputs into the already-born $N - 1$ children. The procedure outlined above for estimating the alternative bundle does not separate inputs into child-unrelated activities from extra inputs into raising earlier children. In the present state of our knowledge, it is important to avoid trying to make that separation. It is very difficult in practice to identify just which inputs go into child-unrelated activities and which are inputs into children, the more so since so many home activities are shared by all family members. Given this difficulty, it is hard to know to what extent an extra child beyond the first is competing with "adult consumption aspirations" and to what extent he competes with higher average inputs for the earlier children, sometimes unhelpfully labeled "child quality."[20]

1.3.3 Actual versus Perceived Costs

The relative cost measure just sketched calls for immense detail on the average costs of a child to his parents, costs that are "actual" costs if one accepts the assumed accuracy of effects derived from survey cross sections. Computing the costs of the child-input bundle and the alternative bundle is an expensive operation. It took a research assistant and myself hundreds of hours to settle on a satisfactory set of estimates for urban United States families in 1960. I would not embark on such a task just before a fertility-relevant bedtime, and I doubt any peasants would either. The process of making the calculations is itself economically unprofitable, since its costs exceed the expected value of the extra information to the average couple. Of what use can the measurement of actual child-cost patterns be if young couples could not perceive the true magnitudes facing them?

To judge the value of measure of actual child costs for fertility analysis, we must begin by rejecting both extreme views. It is as unreasonable to believe that significant movements in actual relative child costs would be totally irrelevant as it is to assume that couples make calculations like the ones sketched here. The shares of parents' income taken up by the inputs into an extra child are impressive by any measure. It would be much harder to ignore a given percentage movement in the cost of an extra child than it would be to ignore a price increase on matches or cooking pans. The budget constraint is too real, especially at low income levels. Even illiterate villagers can count, and they know they have no choice but to make choices.

Interview responses also seem to show some awareness of the economic costs and benefits of children in all societies, both when respon-

dents are asked about these and when they are just asked to extemporize about the pluses and minuses of children.[21] The recent surveys conducted through the East-West Institute suggested that the tendency to describe the gains and losses from children in explicitly economic terms was even greater in rural and lower-income groups than in the more modern settings.[22] Furthermore, many responses that are not explicitly put in monetary terms nonetheless reflect a direct awareness of the time costs and benefits of children, as when couples mention "too much responsibility," "career conflicts," "fear of doing a bad job as a parent" (to previous children), "general freedom and fun conflicts," and "interference with husband/wife affiliative relationship."

It seems advisable to take an intermediate position, believing that couples are somehow made aware of some rough outlines of the economic costs and benefits of extra children. Since they cannot conceivably get their information from a direct calculation of these costs and benefits, the best guess is that they gather them indirectly, by hearing about and observing the fortunes of other couples. Women will tend to hear more about the agonizing conflict between children and career development in settings in which wage rates away from home are high enough to make the conflict real. Peasants will more readily accept the argument that feeding an extra child is a terrible burden "in times like these" when their ability to buy or grow food with child labor is indeed low than when real wages in terms of food have been higher for some time. Where housing is rationed and extra rooms are especially scarce, urban couples will hear from others, if not see for themselves, what problems come home with an extra child. There are, in other words, plausible mechanisms through which couples who would never speak in terms of cost-benefit analysis would nonetheless respond to child costs and benefits, like the man who spoke prose without knowing it.

There remains the problem of deciding which aspects of the actual costs and benefits couples perceive more clearly and which they tend to overlook. This problem is not easily resolved. The only workable strategy here is to pursue the various actual cost considerations as far as the data allow, on the assumption that the perceived importance of any part of the cost calculation is proportional to its actual quantitative importance.

1.3.4 The Discount Rate and Parents' Savings

The issue of perceptions carries over into another aspect of the relative cost formula, an aspect not easily resolved by standard economic theory. In the formulas for the base-period costs of child inputs and inputs into the alternative inputs, all magnitudes were discounted back to a decision-making date one year before the would-be birth. What is the appropriate discount rate?

To some noneconomists, the issue of a discount rate may seem to be just another symptom of overinvestment in elaborate economic theorizing. Yet the issue is as inescapable as it is knotty. Its difficulty was exemplified when one recent seminar participant tried to wave aside the discount rate as irrelevant on the grounds that "Everybody knows that people don't plan very far ahead, so it's obvious that the discount rate is zero." The confusion goes deeper than a mere semantic misunderstanding over how the economist defines the discount rate, especially when the behavior of peasants and other low-income groups is being discussed. On one hand, it is traditional to view them as myopic, which would make them give much more attention to the early costs of infant-rearing than to later child costs and benefits. On the other, it is also traditional to say that children are valued mainly for their income support for the parents in the distant future. Given the limits on the actual ratios of future support from children to early child-rearing costs, it is hard to argue that the discount rate is both high and low.

Economic theory does not suggest a clear choice of discount rate for the effects of children. The usual guideline is that any investment's stream of expected costs and returns should be compared with the expected rates of return on other assets having the same perceived degree of effect on the riskiness of the decision-maker's entire portfolio. This is a weak guideline here, since the returns from the child are more noneconomic than for most other assets. The procedure followed in my child-cost calculations for the urban United States in 1960 has been to calculate all values under a wide range of discount rates running from the unlikely zero rate up to 18% per annum, with preferred rates being 13% for low-income couples (near the private rate of return on college) and 8% per annum for high-income couples (near the private rate of return on graduate education).[23] In what follows, readers will want to note that their own views about the myopia or hyperopia of young couples will tip the scales toward or away from those effects of a child that come soon after birth.

Also complicated, but having lesser effect on the quantitative patterns in child costs, is the issue of the effect of children on their parents' savings in nonhuman form. Over the years in their parents' household, children tend to reduce the parents' savings, though this tendency is mitigated by the children's contribution to family capital formation in many agricultural settings. A careful calculation of the whole lifetime streams of costs and benefits of an extra child must weigh in the fact that the child may cause the parents to dissave and pull their use of resources toward the present at the expense of consumption and leisure in the more distant future. Less clear is whether parents make up this dissaving by the end of their expected life-span. If they had strict targets for the inheritances to be left to each child, they would more than make

up the lost saving in order to allow the extra child his target bequest. If they do not or cannot meet such targets, the effect of the extra child on their savings may be negative even by the time they die. The impact of family size on the final bequests of decedents is empirically unresolved, and an assumption about terminal savings would have to be made for any detailed calculation of child costs. Elsewhere I have assumed that terminal savings are unaffected by the extra child, though the quantitative importance of this assumption looks slight.[24]

1.3.5 The Rise of Average Child Inputs and the Role of Tastes

The relative-cost concept thus defined may seem too narrow to capture all that we think of when discussing the effect of rising child costs on fertility. In particular, one may suspect that there are aspects of the secular rise in average inputs per child that ought to be called a rise in average child "costs" facing succeeding generations of young adults. This suspicion of narrowness has taken two forms in past discussion of the cost issue.

One suspicion, prompted by the use of other household-production-function models, is that the concept as defined here overlooks the simple point that increases in average child inputs drive up the "price" of an extra child. In the language usually used in such models, increases in child quality drive up the shadow price on child quantity. Yet this way of putting it does not specify either the alternatives with which children are being compared or the reasons why higher average inputs per child clearly raise their unit price relative to any commodity, though not relative to an hour of time. Average inputs are on the rise not only for a child, but for other home activities as well. Vacations, entertainment, home improvements, and other activities also absorb rising average inputs. It is not clear that children are rising in price relative to these activities, except to the extent that changes in input prices make such an overall relative price change show in the measure as defined here. In addition, the rise in average inputs, when it occurs for reasons not related to changes in relative input prices, is a force that needs to be explained in terms of tastes and incomes.

The other suspicion is that as incomes grow and development proceeds, people find children increasingly costly in the sense that their upbringing and social position leave them "no choice" but to buy more "costly" children. These forces are real enough. They could in fact be defined as shifts in tastes or as shifts in relative child cost, though this latter approach would have to follow an unconventional route. To make the influence of upbringing and social surroundings an influence on child *costs*, one would have to erect a plausible but empirically elusive argument about information costs. One could plausibly argue that being brought up on, and surrounded by, higher living standards raises the

cost to young couples of finding out how they could manage to rear a child with lower inputs. Conversely, their greater familiarity with high-input modes of child-rearing lowers the cost to them of such children relative to lower-input children and the alternatives to lower-input children. Yet any such attempt to work the influence of upbringing and social surroundings into a cost concept overburdens the concept and removes it from its usual choice-theoretic role. It is simpler, and more productive of interdisciplinary cooperation in research on fertility, to put such influences into the categories of income effects and taste effects, leaving the cost measure to pick up only shifts in observable input price ratios.

1.4 An Application to the United States in the Twentieth Century

To clarify how child costs have changed with the process of economic development, I shall first take advantage of the relative abundance of survey data for the postwar urban United States. It is possible to calculate the entire lifetime profiles of parents' use of time and commodities for a first child, a third child, and the activities these replace, for "low-income" and "high-income" couples in the urban United States in 1960. Several data bases have been combined to generate the lifetime profiles. First a low-income and a high-income husband were chosen with reference to 1960 census data on incomes, the former having an hourly rate of pay rising from $1.31 at age 23 to a peak of $2.28 by age 47 and the second earning from $2.25 an hour at age 23 to $5.15 by age 52. Their wives were given corresponding wage rates. The wives' wage rates, their working hours, and husbands' working hours were all allowed to vary with childbearing experience in accordance with estimates derived from cross-sectional studies. Given these family income profiles (and some savings effects caused by child-rearing), the next step was to estimate the time and commodity inputs into a first child, born on the parents' 24th birthday, and a third child, born on the parents' 30th birthday. The time inputs were estimated from the 1967–68 Cornell time-use survey in Syracuse, and the commodity inputs and net effects of the child on family consumption patterns were estimated from the 1960–61 Survey of Consumer Expenditures and some USDA guesses about child inputs based on the same data. The child was assumed to survive his parents in each case. This set of procedures generated the set of 1960 estimates shown in tables 1.2 through 1.5.[25]

The tables reveal several patterns in the differences between child inputs and the inputs into alternative activities. Regarding commodity inputs, all four tables show that an extra child raises the family's consumption of food, regardless of income level, birth order, or the discount rate. That is, a greater value of food enters as an input into the

child than would have been purchased by the household in pursuit of other extra enjoyments without the child. This food intensity of extra children is not confined to the United States. Household budget surveys from at least 17 countries have also shown that extra children raise the share budgeted for food.[26] The prevalence of this pattern suggests a not-so-surprising corollary to Engel's law: extra dependents, like poverty, raise the share spent on food.

The effect of an extra child on housing expenditures proves slightly negative in all cases except the first child of a low-income couple. This negative effect prevails in most other household budget surveys as well. It runs counter to the natural belief that extra children require more room and should force their parents into purchasing it. The negative shelter effect does not really contradict this belief. The extra children are simply forcing their parents to make cuts somewhere in order to feed them, and part of the cuts come at the expense of total shelter expenditures. Detailed studies of the demand for specific housing characteristics seem to resolve the puzzle by showing that larger families in fact consume more site space as well as more rooms yet cut their expenditures on centrality of location and other dimensions of housing quality so much as to bring a net reduction in shelter expenditures with larger family size.[27] This means that merely following the overall consumer price index for shelter may hide important information about the drift in the relative cost of the kind of housing that is most relevant to children. If site space and extra rooms are rising faster in price, or becoming more severely rationed, than housing in general, then the relative cost of extra children may be rising in a way that the available figures cannot reveal.

Another clear pattern of commodity intensity is that children are luxury-sparing rather than luxury-intensive. That is, they tend to reduce household consumption of highly income-elastic commodities, as shown by the negative share differentials for "all other" on the right in tables 1.2 through 1.5. It would be highly desirable to break down this large residual category further to identify more fully just which luxury goods are most strongly associated with the alternative input bundle. With such information, it would be possible to be more selective in choosing price indexes for measuring the relative cost of an extra child across time and space. For the present, however, it is necessary to stick to the general observation that luxury goods are heavily associated with the alternative life-styles with which extra children compete.

Tables 1.2 through 1.5 also quantify the time inputs into children and into the alternatives to children. The gross adult time cost accounts for about half the total cost of either a first or a third child at the preferred discount rates (13% in tables 1.2 and 1.3, 8% in tables 1.4 and 1.5). The number of hours represented by this time cost is of course greater

Table 1.2 **Cost Shares, "Low-Income" Couple's First Child and Alternative Activities, Based on 1960 Urban Cross-Sectional Data for the United States**

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N − H)		
Discount Rate		0%	13%	18%	0%	13%	18%	0%	13%	18%
Total amount, all inputs	$	21,102	9,069	7,365	28,138	8,135	6,417			
	%	100	100	100	100	100	100	—	—	—
Adult time inputs	$	8,569	4,591	3,970	2,603	1,644	1,493			
	%	40.6	50.6	53.9	9.3	20.2	23.3	31.3	30.4	30.6
Child's chore and paid work contribution	$	−1,849	−333	−188	—	—	—			
	%	−8.8	−3.7	−2.6	—	—	—	−8.8	−3.7	−2.6
Net time inputs	$	6,720	4,258	3,782	2,603	1,644	1,493			
	%	31.8	47.0	51.4	9.3	20.2	23.3	22.5	26.8	28.1
Food	$	4,267	1,378	1,008	4,630	930	706			
	%	20.2	15.2	13.7	16.5	11.4	11.0	3.7	3.8	2.7
Shelter	$	3,562	1,304	990	4,604	1,144	858			
	%	16.9	14.4	13.4	16.4	14.1	13.4	0.5	0.3	0.0
Medical care	$	1,107	618	544	1,182	281	189			
	%	5.2	6.8	7.4	4.2	3.5	2.9	1.0	3.3	4.5
All other commodities	$	5,446	1,511	1,041	15,119	4,136	3,171			
	%	25.8	16.6	14.1	53.7	50.8	49.4	−27.9	−34.2	−35.3

Table 1.2 (continued)

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N − H)		
Discount Rate		0%	13%	18%	0%	13%	18%	0%	13%	18%
Child clothing	$	3,043	nc	nc	—	—	—			
	%	14.4	nc	nc	—	—	—	14.4	nc	nc
Utilities	$	1,649	nc	nc	2,514	nc	nc			
	%	7.8	nc	nc	8.9	nc	nc	−1.1	nc	nc
Transportation	$	0	0	0	2,475	nc	nc			
	%	0	0	0	8.8	nc	nc	−8.8	nc	nc
Recreation	$	628	nc	nc	383	nc	nc			
	%	3.0	nc	nc	1.4	nc	nc	1.6	nc	nc
Education	$	126	nc	nc	00	00	00			
	%	0.6	nc	nc	00	00	00	0.6	nc	nc
Total commodity inputs	$	14,382	4,811	3,583	25,535	6,491	4,924			
	%	68.2	53.0	48.6	90.7	79.8	76.7	−22.5	−26.8	−28.1
Difference in total bundle values[a]	$	7,036	−934	−948						

Note: nc = not calculated. — = zero by definition. 0 = zero by assumption. 00 = zero by estimation.
[a]The reduction in the mother's rate of pay as a result of the child times the hours she would have worked without the child, *minus* the value of the income-tax exemption per child.

Table 1.3 **Cost Shares, "Low-Income" Couple's Third Child and Alternative Activities, Based on 1960 Urban Cross-Sectional Data (Three-year Child Spacing)**

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N — H)		
Discount Rate		0%	13%	18%	0%	13%	18%	0%	13%	18%
Total amount, all inputs	$	15,050	6,801	5,533	16,059	6,721	5,556			
	%	100	100	100	100	100	100	—	—	—
Time inputs by adults and older siblings	$	6,043	3,331	2,842	4,195	2,534	2,280			
	%	40.1	49.0	51.4	26.1	37.7	41.0	14.0	11.3	10.4
Child's chore and paid work contribution	$	—1,650	—297	—168	—	—	—			
	%	—11.0	—4.4	—3.0	—	—	—	—11.0	—4.4	—3.0
Net time inputs	$	4,393	3,034	2,674	4,195	2,534	2,280			
	%	29.2	44.6	48.3	26.1	37.7	41.0	3.1	6.9	7.3
Food	$	4,047	1,304	954	2,079	670	536			
	%	26.9	19.2	17.2	12.9	10.0	9.6	14.0	9.2	7.6
Shelter	$	2,532	902	686	2,907	1,172	888			
	%	16.8	13.3	12.4	18.1	17.4	16.0	—1.3	—4.1	—3.6
Medical care	$	1,012	586	507	757	272	189			
	%	6.7	8.6	9.2	4.7	4.0	3.4	2.0	4.6	5.8
All other	$	3,066	975	712	6,121	2,073	1,663			
	%	20.4	14.3	12.9	38.1	30.9	29.9	—17.7	—16.5	—17.0

Table 1.3 (continued)

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N — H)		
Discount Rate		0%	13%	18%	0%	13%	18%	0%	13%	18%
Child clothing	$	1,300	nc	nc	567	nc	nc			
	%	8.6	nc	nc	3.5	nc	nc	5.1	nc	nc
Utilities	$	1,413	nc	nc	1,562	nc	nc			
	%	9.4	nc	nc	9.7	nc	nc	—0.3	nc	nc
Transportation	$	0	0	0	583	nc	nc			
	%	0	0	0	3.6	nc	nc	—3.6	nc	nc
Recreation	$	271	nc	nc	299	nc	nc			
	%	1.8	nc	nc	1.9	nc	nc	—0.1	nc	nc
Education	$	82	nc	nc	97	nc	nc			
	%	0.5	nc	nc	0.6	nc	nc	—0.1	nc	nc
Total commodity inputs	$	10,657	3,767	2,859	11,864	4,187	3,276			
	%	70.8	55.4	51.7	73.9	62.3	59.0	—3.1	—6.9	—7.3
Difference in total bundle values[a]	$	+1,009	—80	+23						

Note: nc = not calculated. — = zero by definition.
[a]The reduction in the mother's rate of pay as a result of the child times the hours she would have worked without the child, *minus* the value of the income-tax exemption per child.

Table 1.4 **Cost Shares, "High-Income" Couple's First Child and Alternative Activities, Based on 1960 Urban Cross-Sectional Data for the United States**

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N − H)		
Discount Rate		0%	8%	13%	0%	8%	13%	0%	8%	13%
Total amount, all inputs	$	41,520	21,402	15,890	68,658	18,873	13,121			
	%	100	100	100	100	100	100	—	—	—
Adult time inputs	$	16,131	10,523	8,647	4,898	3,682	3,357			
	%	38.9	49.2	54.4	7.1	19.5	25.5	31.8	29.7	28.9
Child's chore and paid work contribution	$	−3,684	−1,229	−661	—	—	—			
	%	−8.9	−5.7	−4.2	—	—	—	−8.9	−5.7	−4.2
Net time inputs	$	12,446	9,294	7,986	4,898	3,682	3,357			
	%	29.9	43.4	50.3	7.1	19.5	25.5	22.8	23.9	24.8
Food	$	6,423	2,969	2,027	11,614	2,460	1,553			
	%	15.4	13.9	12.8	16.9	13.0	11.8	−1.5	0.9	1.0
Shelter	$	4,630	2,325	1,657	8,765	2,315	1,492			
	%	11.1	10.9	10.4	12.8	12.3	11.4	−1.7	−1.4	−1.0
Medical care	$	1,563	976	794	3,969	776	489			
	%	3.8	4.6	5.0	5.8	4.1	3.7	−2.0	0.5	1.3
All other commodities	$	16,458	5,838	3,426	39,412	9,640	6,230			
	%	39.5	27.3	21.6	57.4	51.1	47.6	−17.9	−23.8	−26.0

Table 1.4 (continued)

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N − H)		
Discount Rate		0%	8%	13%	0%	8%	13%	0%	8%	13%
Child clothing	$	4,891	nc	nc	—	—	—			
	%	11.7	nc	nc	—	—	—	11.7	nc	nc
Utilities	$	3,223	nc	nc	3,408	nc	nc			
	%	7.8	nc	nc	5.0	nc	nc	2.8	nc	nc
Transportation	$	0	0	0	4,334	nc	nc			
	%	0	0	0	6.3	nc	nc	−6.3	nc	nc
Recreation	$	1,498	nc	nc	432	nc	nc			
	%	3.6	nc	nc	0.6	nc	nc	3.0	nc	nc
Education	$	6,846	nc	nc	3	nc	nc			
	%	16.4	nc	nc	0.0	nc	nc	16.4	nc	nc
Total commodity inputs	$	29,074	21,108	7,904	63,760	15,191	9,764			
	%	70.1	56.6	49.7	92.9	80.5	74.5	−22.8	−23.9	−24.8
Difference in total bundle values[a]	$	27,138	−2,529	−2,769						

Note: nc = not calculated. — = zero by definition. 0 = zero by assumption.
[a]The reduction in the mother's rate of pay as a result of the child times the hours she would have worked without the child, *minus* the value of the income-tax exemption per child.

Table 1.5 **Cost Shares, "High-Income" Couple's Third Child and Alternative Activities, Based on 1960 Urban Cross-Sectional Data (Three-year Child Spacing)**

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N — H)		
Discount Rate		0%	8%	13%	0%	8%	13%	0%	8%	13%
Total amount, all inputs	$	32,108	16,628	12,341	36,650	14,748	11,560			
	%	100	100	100	100	100	100	—	—	—
Time inputs by adults and older siblings	$	11,324	7,583	6,268	8,022	5,717	4,789			
	%	35.3	45.6	50.1	21.9	38.8	41.4	13.4	6.8	8.7
Child's chore and paid work contribution	$	−3,013	−1,011	−546	—	—	—			
	%	−9.4	−6.1	−4.4				−9.4	−6.1	−4.4
Net time inputs	$	8,311	6,572	5,722	8,022	5,717	4,789			
	%	25.9	39.5	45.7	21.9	38.8	41.4	4.0	0.7	4.3
Food	$	6,053	2,806	1,917	5,214	1,607	1,136			
	%	19.0	16.9	15.5	14.2	10.9	9.8	4.8	6.0	5.7
Shelter	$	3,423	1,684	1,195	5,357	2,089	1,499			
	%	10.7	10.1	9.7	14.6	14.2	13.0	−3.9	−4.1	−3.3
Medical care	$	1,084	930	761	1,798	833	616			
	%	3.4	5.6	6.2	4.9	5.6	5.3	−1.5	0.0	0.9
All other	$	13,237	4,636	2,746	16,259	4,502	3,520			
	%	41.3	27.9	22.2	44.4	30.5	30.4	−3.1	−2.6	−8.2

Table 1.5 (continued)

		Child Inputs (N Bundle)			Alternative-Activity Inputs (H Bundle)			Differences in Shares (%) (N − H)		
Discount Rate		0%	8%	13%	0%	8%	13%	0%	8%	13%
Child clothing	$	2,780	nc	nc	1,088	nc	nc			
	%	8.7	nc	nc	3.0	nc	nc	5.7	nc	nc
Utilities	$	2,837	nc	nc	4,190	nc	nc			
	%	8.8	nc	nc	11.4	nc	nc	−2.7	nc	nc
Transportation	$	0	0	0	1,859	nc	nc			
	%	0	0	0	5.1	nc	nc	−5.1	nc	nc
Recreation	$	885	nc	nc	1,221	nc	nc			
	%	2.8	nc	nc	3.3	nc	nc	−0.5	nc	nc
Education	$	6,735	nc	nc	259	nc	nc			
	%	21.0	nc	nc	0.7	nc	nc	−20.3	nc	nc
Total commodity inputs	$	23,797	10,056	6,619	28,628	9,031	6,771			
	%	74.1	60.5	54.3	78.1	61.2	58.6	−4.0	−0.7	−4.3
Difference in total bundle values[a]	$	4,542	−1,880	−781						

Note: nc = not calculated. — = zero by definition. 0 = zero by assumption.
[a]The reduction in the mother's rate of pay as a result of the child times the hours she would have worked without the child, *minus* the value of the income-tax exemption per child.

for a first child than for a third. Virtually all these hours fall as a burden on the mother, since the Syracuse time-use survey, like every other time-use survey, shows that the mother's child-care time far outweighs that of the father and accounts for most of the total care time, regardless of socioeconomic class or nation of residence.[28]

It is also clear that an extra child, especially a firstborn, is time intensive in the postwar urban United States. That is, the time inputs into the child exceed in economic value the time supplied by the child. Figure 1.2 develops this point further by showing an age profile of the time costs and contributions of the child, which will be compared with similar measures for other countries below. Figure 1.2 shows not only that a child is time-intensive in this setting, but also that he causes a net reduction in the household's earnings, even after his own slight teenage earnings are taken into account. Firstborns take a greater share of their total time demands away from the parents' paid work than do third-borns on the average, since firstborns tend to pull the mothers away from a job while third-borns tend to pull already housebound mothers away from other household work and leisure.[29]

The net time-intensity of these modern prototypes looks even higher at positive discount rates, since the time costs are concentrated in infancy while the time contributions from each child come at a much later age. Another adjustment would also raise the time-intensity somewhat. The calculations in tables 1.2 through 1.5 have valued the time inputs into the child at the wife's child-burdened wage rate. This convention makes no allowance for the fact that the arrival of the child cuts the mother's wage rate, through lost work experience, as well as her hours of work. This loss of her earning potential equals a large figure something like the differences in total bundle values at the bottoms of tables 1.2 through 1.5. This loss of on-the-job investment in subsequent pay raises could reasonably be added to the value of the time inputs into the child. Doing so would raise the time-intensity of a child and make the relative cost index more sensitive to movements in real wage rates than it is here.

The 1960 weights for time and commodity inputs in tables 1.2 through 1.5 can be combined with aggregate price and wage series to generate a relative cost index that moves over time. Using the weights from tables 1.2 and 1.3, covering the more representative lower-income families, yields the time series on relative child costs shown in figure 1.2 and table 1.6.

The one time period in which the fixed bundles of child inputs clearly became cheaper relative to the alternative bundle was during World War II. The cheapening of children was caused by the sudden entry of a majority of families into the ranks of income-tax-payers between 1940 and 1945. For the new taxpayers the income-tax exemptions for de-

pendents became relevant for the first time, dropping the cost of a first-born by 9% and the cost of a third-born by 16%—more than enough to outweigh the increases in relative child cost implied by the wartime rise in real wage rates.

Aside from World War II, there has been a slow but unmistakable rise in relative child costs, caused by the leverage of rising real wage rates on the cost of time-intensive children. This suggests that economic development may monotonically raise relative child costs by raising real

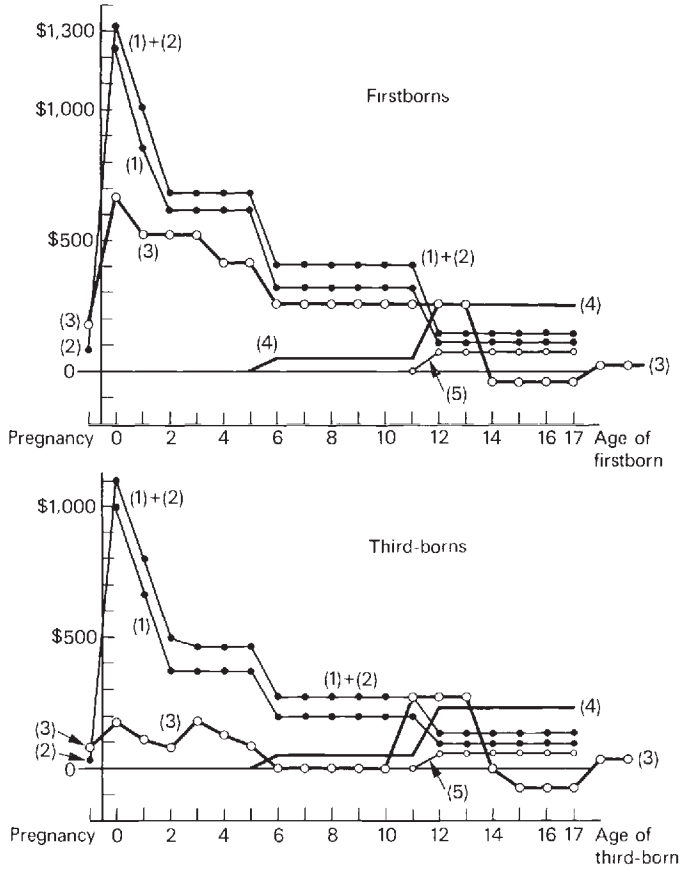

Fig. 1.2 Value of time taken and supplied by firstborn and third-born children, urban United States children, 1967–68 time use and 1960 work effects at 1960 "low-income" wage rates. From Lindert (1978). (1) child-care time by all persons, at wife's wage rates; (2) other chore time increases for wife; (3) net loss of paid work by parents; (4) child's chore plus paid work contribution; (5) child's paid work, a part of (4).

Table 1.6 **Relative Cost Indexes for a First and a Third Child, Urban United States, 1900–1970**

Year	(1) Price of Inputs into the Child (P_N)	(2) Ditto, Adjusted for Income-Tax Exemption (P'_N)	(3) Price of Inputs into Alternative Activities (P_H)	(4) Relative Child Cost Index (P'_N/P_H)
		First Child		
1970	137.32	138.56	134.83	1.0276
1965	111.09	111.85	108.57	1.0302
1960	100.00	100.00	100.00	1.0000
1955	87.10	87.13	88.24	.9996
1950	75.21	75.80	77.48	.9783
1945	52.86	51.74	57.10	.9061
1940	41.72	44.59	45.64	.9771
1935	39.20	41.90	43.88	.9549
1933	35.23	37.66	41.46	.9083
1930	43.78	46.80	49.63	.9929
1925	45.10	48.21	50.76	.9844
1922	42.36	45.28	48.97	.9246
1920	43.82	46.84	49.38	.9485
1919	41.09	43.92	43.85	1.0016
1914	23.74	25.38	27.15	.935
1910	22.39	23.93	26.03	.919
1900	18.92	20.22	22.86	.885
		Third Child		
	(1)	(2)	(3)	(4)
1970	137.06	139.21	136.18	1.0223
1965	110.90	112.22	110.16	1.0187
1960	100.00	100.00	100.00	1.0000
1955	87.36	87.40	87.44	.9996
1950	75.68	76.72	75.70	1.0134
1945	53.09	51.04	54.54	.9357
1940	41.59	46.61	43.80	1.0643
1935	39.29	44.04	41.28	1.0668
1933	35.19	39.44	38.22	1.0319
1930	44.10	49.43	46.68	1.0589
1925	45.45	50.94	48.09	1.0593
1922	42.61	47.76	45.71	1.0448
1920	45.00	50.44	45.61	1.1058
1919	42.03	47.11	41.83	1.1262
1914	24.12	27.03	25.47	1.0612
1910	22.69	25.43	24.31	1.0461
1900	19.10	21.41	20.96	1.0215

wage rates. Yet, as we shall see below, this implication cannot be drawn for early stages of development, since children have become time-intensive only in later stages.

Figure 1.3 and table 1.6 might seem to encourage the view that movements in relative child costs explain the United States postwar fertility waves, in view of the wartime dip just before the onset of the baby boom and the rise in costs before the baby bust of the 1960s and 1970s. Yet several alternative regressions reported elsewhere assign only a more limited role to relative cost movements. The most generous regression result credits the wartime decline in the relative cost of a third-born with a significant but small part of the fertility rise of the 1940s and of the fertility decline across the 1960s.[30] Across the 1950s, on the other hand, fertility rose slightly while relative costs also rose. These results suggest that movements in relative costs have played a role in recent fertility fluctuations, yet fall far short of fully accounting for them.

1.5 Are Extra Children Ever Economic Assets?

The cost of a surviving child in the contemporary United States is so high that the initial question to ask about the evolution of child costs with development is simply whether a newborn child offered more expected benefits than costs to his parents in a context of economic underdevelopment. This is commonly presumed but has never been empirically demonstrated. It is not easy to quantify the net gains from a child in a setting in which much of the economic exchange between children and adults never enters the marketplace. Either of two kinds of data would be required. One would be detailed survey data on time use within households in a less developed economy, supplemented by data on the commodity consumption patterns of the same households. The other would be market valuations of child services and child support in settings where children are managed for profit by nonparents. Fortunately, both kinds of data are just now becoming available, some from the early history of the currently industrialized countries and some from contemporary surveys in developing countries. The data are so scattered across nations and time that the present empirical picture must be a very incomplete mosaic.

A starting point for judging the cost or asset value of a newborn child in an underdeveloped economy is the available historical data on the economics of managing a child for profit. Slaveowners in the United

Source: Table 1.6 and figure 1.3 were calculated from the 1960 "low-income" bundle weights in tables 1.2 and 1.3, plus time series on tax exemptions, wage rates, and price indexes for food, shelter, and all other commodities as given in *FSA*, app. F.

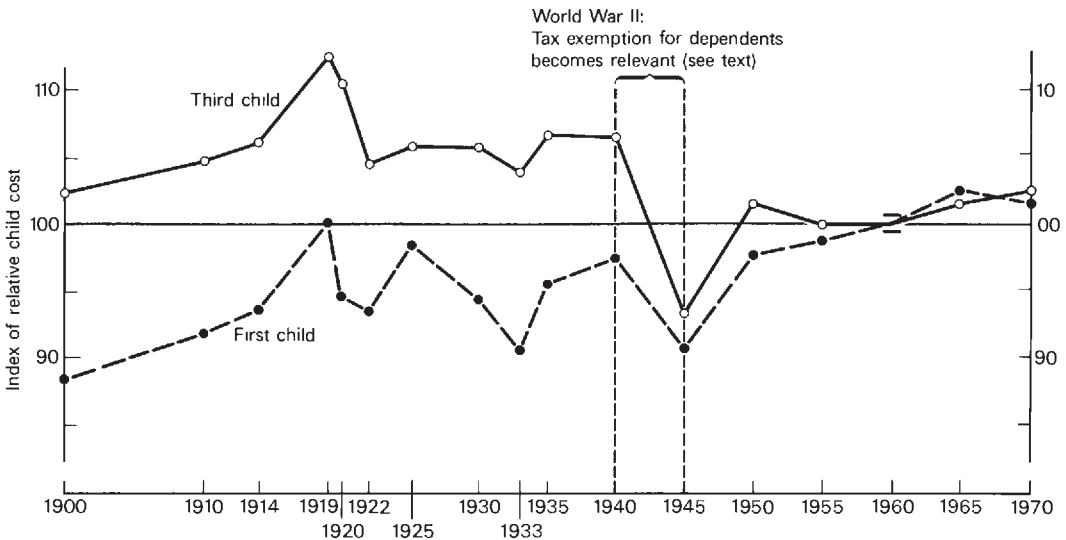

Fig. 1.3 Relative cost indexes for a first and a third child, urban United States, 1900–1970 (1960 = 100; 1960 "low-income" weights from tables 1.2 and 1.3).

States South had a great stake in correct appraisal of the survival chances, work capacity, and costs of support of slave children. They had to appraise not only the child's consumption and productivity in producing salable crops, but also his potential for chores on the plantation and the minimal time spent by all adults in supervising the child at the expense of other tasks. Given these considerations and the child-labor-intensity of cotton to be documented further below, one can assume that if any newborn children were a net asset, slave children were.

The fact that newborn slave children had a positive market value in the antebellum South shows an extreme upper bound on the average value of a newborn to his parents in an agriculture where modernization has not proceeded beyond such implements as the cotton gin. This market value shows what a parent could expect from a live birth if he not only worked his child like a slave but kept receiving all the returns from the productivity of any surviving child beyond slave-level consumption for the child until the parent's death. This is an extreme case of parent exploitation, of course, since most children leave home at about age twenty and give their parents much less support than was extracted by slaveowners. To improve the analogy with the parent's investment, one must look more closely at the effects of a slave child in his first twenty years, temporarily setting aside old-age support for the parent.

The cost and earnings of a slave child were roughly quantified for 1846–50 in the pioneering work of Conrad and Meyer.[31] Their estimates of the costs and returns from slave children by age and sex can be combined with Robert Evans's estimates of age-specific survival rates for slave children in 1850.[32] The Conrad-Meyer estimates imply that over the first twenty years of life, including the initial costs in nursery and the mother's work loss, a surviving slave child brought an undiscounted net return of $194. The rate of return on a guaranteed survivor was just below 8% per annum, while the rate of return on a live birth given the infant and child mortality rates works out to have been between 6% and 7%. These rates of return, while below those reckoned on adult slaves (8–14%), are positive and imply that a child raised in the manner of a slave could be a slight net asset even without including any expected value of old-age support. And the true rate of return over the slave's life may have been slightly higher than this synthetic cross-sectional estimate for 1846–50, given the moderate growth in slave productivity across the antebellum era. Thus far, a slave childhood seems to have been slightly profitable to the slaveowner.

These estimates of slave-child profitability should be cross-checked against other data on the same issue, since the Conrad-Meyer estimates are really their own interpolations based on adult slave productivity and scraps of information on the ages at which slave children began work

and began to make back their upkeep. We can judge the profitability of a slave's childhood years from the more reliable data on slave purchase prices in the New Orleans slave market, hire rates and upkeep costs for adult slaves, and, again, Evans's survival rates. Given that prospective slaveowners had the alternative option of buying adult slaves, it is reasonable to assume that they would have discounted the expected returns and costs of a slave childhood at a rate of return similar to that earned on an adult slave. While the original profitability estimates for adults by Conrad and Meyer had been exposed to a number of criticisms, there is general agreement that the cross-sectional rate of return on adult slaves for the 1850s would be between 8% and 14% per annum.[33] Given this range of the adult rate of return, r, we can relate the market prices on newborns (P_0) and 20-year-olds (P_{20}) to the implied present value of the first twenty years of the slave child's life ($PV_{0\text{-}20}$) by the formula

$$P_0 = PV_{0\text{-}20} + \frac{s_{20}P_{20}}{(1+r)^{20}}, \tag{11}$$

where s_{20} is the perceived share of newborns surviving to age 20, assumed to equal Evans's estimate for 1850. In this case we get something close to a zero net profit on a slave childhood. The present value of the childhood years, $PV_{0\text{-}20}$, is $-\$42$ if the survival-weighted value of a 20-year-old is discounted at 8%, and $+\$47$ if a discount rate of 14% is applied.[34] I infer that if parents in an agricultural setting like that of the antebellum South had discounted uncertain future costs and returns at rates like those revealed by cross sections of slaveownership, and had exploited their children like slaves, the net economic value of raising a child who would leave the home at 20 would be about zero.

The economic flows between a freeborn child and his parents in underdeveloped settings can only be judged, as mentioned, with the help of extensive data on the exchanges of time use within the household. Fortunately, rural time-use studies have recently been conducted in the Philippines, Java, and Nepal.[35] Of these, the most extensively surveyed was also the most affluent. A survey in rural Laguna in the Philippines gathered data on time use in 571 households in May, June, and July 1975. The surveyed barrios were rural, but not remote: just south and east of Los Baños, and within transistor-radio distance of Manila, about 60 miles away. The season was one of intensive crop cultivation, perhaps raising work time by women and children above the annual average. On the other hand, school began in June, probably cutting productive work time by some of the children. The survey measured the allocation of time across several activities for a recent week. While there were some problems in coding time spent on several activi-

ties at once, the data are not too different in concept from those from recent United States time-use surveys. Earnings were estimated directly, and the values of other home productive work were imputed with the help of data on likely wage rates for hiring out different home tasks.[36]

Tentative regression results from the Laguna survey reveal the time costs and contributions of a second-born or later-born child.[37] These are plotted in figure 1.4. The time spent by the parents on child care (series 1) refers to care of preschool children only.[38]

Perhaps surprisingly, the extra child does not reduce the parents' earnings over his first twenty years in their household.[39] There is a noticeably positive effect of extra children on the working hours of fathers in Laguna. Whether owing to a feeling of extra responsibility or to a greater desire to get away from the house and children, this "moonlighting father" effect appears to be somewhat stronger in Laguna than in the postwar nonfarm United States.[40] A clearer contrast with contemporary United States patterns of behavior is the effect of the extra child on the mother's income-generating work. This effect is negative, as one would expect, for the first year after birth (a work loss of 5.3 hours a week) but is essentially zero thereafter. The explanation seems to be simply that in rural Laguna, as in all the other rural settings for which relevant data have been gathered, the mother's various productive tasks are all so close to home that she can juggle her schedule and combine tasks so as to avoid any great personal work loss from an extra child. The net result is that an extra child, although he has a positive adult-time cost within the home, actually raises the parents' work hours and earnings.[41]

The extra child contributes to his parents' household a good deal more time than he takes. Here it is only possible to report the average value of productive time use by all children over the age of 7 rather than to give a detailed age profile. It is nonetheless clear from figure 1.4 that children contributed more time, both in all productive tasks and in income-earning work, than they took from their parents. Children in rural Laguna are clearly time-supplying, not time-intensive like their urban United States counterparts. In such a setting, any general increase in rural real wage rates on common labor would apparently make an extra child look *less* costly relative to the alternative life-styles with which he competed in his parents' household.

To judge whether the net time contribution of the extra child is sufficient to make him a net asset, we need data on the commodity inputs concerned. Values of the food, clothing, educational, and other inputs into an extra child in Laguna are now being tabulated. As a preliminary conservative guess, one can combine Lorimer's crude consumption-equivalence scales for children and adults with the Laguna income data

to put peso values on the likely consumption of commodities by the extra child.[42] The resulting provisional figures are plotted as series 3 of figure 1.4.

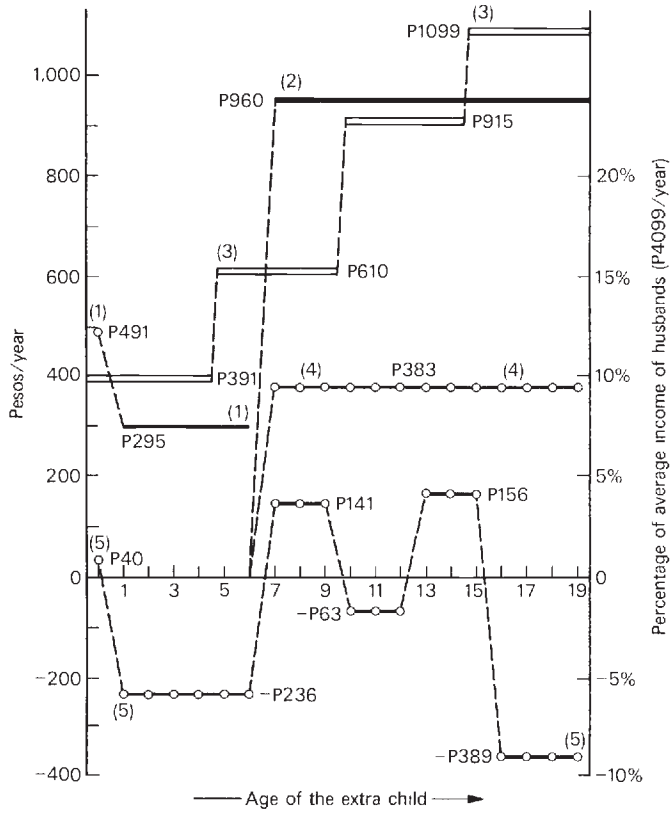

Fig. 1.4 Average time-use effects, commodity consumption, and work effects of an extra child in a household with children, by age of the extra child—rural Laguna, Philippines, 1975. From Boulier 1976, tables IA, IIA, IIIA. (1) preschool child care time by the parents (+ = cost); (2) average time contribution of a child over 7, all productive work; (3) crude estimate of the child's commodity consumption, using Lorimer consumption-equivalent scales; (4) average earnings of a child over 7; (5) effect on earnings of the two parents (+ = loss of earnings). Net cost of the child is approximated by (1) + (3) − (2).

It tentatively appears that a surviving later-born child would bring a slight net cost to his parents while growing up within their household, since the excess of the child's time contribution over time cost is not quite sufficient to match the commodity cost. To be sure, the net cost of the child turns out to be much lower as a share of household income or of an adult male's average earnings than in the postwar United States. Yet thus far it appears that the extra rural Filipino child is not a net economic asset to his parents while still a child. If this conclusion stands up to further evidence, it contrasts the freeborn rural child to the slave child. More important, it provides some tentative support for Eva Mueller's suspicions against the view that a newborn child is a net economic asset in underdeveloped rural economies.[43]

The net preadult costs of an extra child in the rural Laguna area would be reinforced by some conservative biases in the measures shown in figure 1.4. First, the time costs of the child have been underestimated by the exclusion of care for them by nonparents, by excluding measures of their effect on the mother's cleaning-up chores and meal preparation time, and by the already-noted bias related to the care of younger siblings by older siblings. Second, a firstborn child would receive more time inputs than the later-borns. Third, the figures all refer to a surviving child, and any net benefits from a child at the older ages that might appear if the estimates in figure 1.4 were optimistically revised would be reduced by mortality in greater proportion than the clearly positive net costs in the infant years. Finally, if one takes the position that parents psychically discount more distant effects at a positive discount rate, then the immediate net costs of pregnancy (omitted here) and infancy loom proportionately larger.

Some additional useful fragments of information on the net-asset issue are provided by two other recent time-use surveys, one for a Javanese village and another for the low-ranking Thami caste in a Nepalese village, both conducted in 1972–73.[44] These data sets have the advantage of applying to a less-developed rural setting than the Philippine sample. They are also based on extensive interviews spread out over more than a year. They have the disadvantage of relating to fewer households—20 in Java and 45–50 in Nepal—and supplying less detailed information on some key variables. Nonetheless, they do offer another look into the uses of time within rural households, beyond what data on market work alone can reveal.

Table 1.7 sketches the time contributions of children over 6 years old in these two villages. Their overall contribution ("all work") is a much larger share of adult male work time than would be contributed by the same ages and sexes in the postwar United States, and even a somewhat larger share than contributed in the rural Philippine sample.

It is also larger than the total child-care time per household contributed by all adults in the village in Java, suggesting that the children in the Javanese and Nepalese cross sections, like those in the rural Philippines, are net suppliers of time and not time-intensive activities for their parents' household.[45] These time contributions, however, must be weighted by the average wage rate or productivity of the working children, who presumably earned at a lower hourly rate than adult males. Table 1.7 reminds us that the work-time ratios greatly overstate the work-value ratios of children to adults, by showing how the fact that the average child's wage rate was only half the adult male rate cut into the relative value of children's work contribution in rural Egypt in 1964–65.

To reach a conclusion about the net economic value of the hypothetical cross-sectional newborn child in rural Java or Nepal, one would again need data on commodity consumption by children and also on their survival chances. These are currently lacking for the Java and Nepal samples. One can only suggest that if the ratios of consumption patterns to adult male earnings are comparable to those in Laguna, the somewhat higher time contribution of the Javanese and Nepalese children would bring them closer to the margin of being net assets to their parents.

It thus appears possible that in underdeveloped rural settings an extra child could have been a slight net asset. The Philippine data tentatively argue in favor of the opposite view, but for the United States slave economy and Javanese and Nepalese villages, the net benefits may have been positive. At the moment, the net-asset issue remains unresolved for truly underdeveloped economies.[46] Yet two clear patterns are emerging: children were much less of a net burden as a share of family or adult male income in these cases than in developed countries, and children were clearly time supplying.

Rough calculations like these serve to bring out a further point relating to the historical decline in infant and child mortality. It is common to argue that couples set a target number of surviving children and respond, with a lag, to declining infant and child mortality by having fewer births now that fewer are needed to achieve the target. The presumption deserves further empirical tests, in view of the ease of presuming an opposing model of tastes in which couples react to the death of children by becoming less sanguine about having others. The age profiles of child costs and benefits now remind us of another basis for challenging the usual view: children invariably start out as a net cost and become net benefits only after nine or more years. This means that high mortality is a force holding up the net costliness of a live birth or pregnancy by limiting the shares surviving to the net-benefit phase. When infant and child mortality decline with the onset of modernization, the improve-

Table 1.7 **The Work Inputs of Rural Javanese, Nepalese, and Egyptian Children of Various Age-Sex Groups Expressed as Percentages of the Average Work Inputs of Male Adults**

	6–8 Years	9–11 Years	12–14 Years	15–19 Years
		A. Javanese Village		
		All Work		
Boys	43	38	56	91
Girls	39	62	99	120
		Directly Productive Work		
Boys	23	24	42	71
Girls	15	39	59	86
		B. Nepalese Village		
		All Work		
Boys	37	65	73	93
Girls	47	82	96	110
		Directly Productive Work		
Boys	37	61	69	93
Girls	30	71	81	98
		6–11 Years	12–15 Years	16–19 Years
		C. Rural Egypt, 1964–65		
		All Work Outside the Household		
Boys, % of adult male work inputs		14.1	69.3	92.2
% of adult male earnings:[a]		7.1	34.9	46.4
Girls, % of adult male work inputs		8.7	33.2	na
% of adult male earnings:[a]		4.4	16.7	na

Sources: Table 7: a and b, Nag 1976, table 5; c, Mueller 1976, table III-3, and Hansen 1969, p. 308. The reference to adult males in Java and Nepal is to an average work input for all sampled males over 15. This input into "all work" was about 8.5 hours a day in the Javanese village and about 10 hours a day in the Nepalese village.

Note: na = not available.

[a]Assuming that the average ratio of child to adult-male daily wage rates of .503 applied to all age-sex groups.

ment in survival chances may make a newborn seem like more of a net asset or less of a liability. There are, in other words, good theoretical reasons for remaining agnostic on the link between child mortality and fertility. The facts have also held back their support: infant mortality shows a significantly positive effect on fertility in some cross sections

but not others and remains subject to suspicions of having taken credit for influences that are due to omitted variables.

1.6 Old-Age Support

It is traditional to argue that in underdeveloped economies parents expect and receive considerable support from their surviving children in their old age. This is assumed to be one of the main reasons why children are net assets in less developed countries. The decline in this reliance on children is traditionally thought to be one of the main ways economic development reduces fertility. The evidence for this view comes in three forms.

The most directly relevant evidence comes from interviews on the perceived importance of old-age support and its relationship to the case for having children. The evidence seems to form a neat pattern: time, development, and urbanization all reduce the stated importance of future old-age support from children. In the East-West Center's surveys in East Asia and Hawaii in the early 1970's, old-age support was more frequently mentioned as an advantage of having children by rural than by urban respondents, and its frequency by nation correlated inversely with national income per capita.[47] A generation of family-planning surveys in Japan found young wives' "willingness to depend" on their children in their old age steadily declining from over half in 1950 to a quarter in 1971, with rural wives more willing to depend than urban.[48]

A second kind of evidence is cross-sectional regression evidence that fertility is significantly lower in countries with social insurance benefits established for the elderly, other variables held equal.[49]

The final form of evidence is data on coresidence of parents and grown children. Elderly parents clearly live with their children more often in less developed economies.[50] The breakup of intergenerational coresidence over the course of development is even more pronounced than the usual data on residence in the same household can reveal, since the tendency of elderly parents to live nearby in the same village has also declined, a fact that has complicated recent research on the evolution from extended toward nuclear families.

If one were simply to accept the decline in old-age support as fact, then it fits neatly into the relative-cost concept and into the delay and ultimate arrival of the fertility transition. The old-age support can be incorporated into the relative-cost measure, data permitting, as a supply of work from the children, one that comes in the parents' old age, after the children have become adults. In the early phase of development, when this support looms large in the perception of benefits from an extra child, its economic value is in fact raised by two trends. Declining

mortality raises the probability that any one child will live long enough to deliver the kind of support one expects on the assumption that one will live a long time. Meanwhile the secular rise in real wages raises the purchasing power that any surviving child can command as a parent-supporting adult, raising the economic value of any given work on the parent's behalf. These trends contribute to maintaining higher fertility in the early stages. At the same time, income growth makes the share of parents needing and expecting such support decline with each generation. By the later phases of growth this old-age-support effect has given away to a taste effect: the rising standards the succeeding generations of couples have for support of each child also involve increasing consciousness of the need to leave a nonhuman wealth legacy as well as the need for development of human skills in growing children. This effect helps feed the ultimate fertility decline, buttressed of course by the ultimate rise of social security programs.

Before adding a layer of theory to an argument enjoying moderate empirical support, however, it must be noted that the importance of this argument is hard to quantify. And when one looks closer at problems of quantifying on the importance of old-age support, one finds reason to wonder whether this argument for peasants' having more children is as traditional among peasants as among scholars studying them.

The direct evidence need not convince. It is cheap for interview respondents to say they feel old-age support from children is one of the advantages of having children. (Saying so may even have its own advantages if the children are present at the interview.) The responses about old-age support may also express the anticipation of future companionship as much as future economic support. The international regression evidence is also vulnerable to the suspicion that social security programs are correlated with the fertility-reducing influences owing to such omitted variables as socialism, the position of women, housing scarcity, and so forth.

When one looks more closely at the evidence on coresidence, one discovers a host of reasons for wondering whether the actual old-age support was ever great enough to decline greatly, reasons that inevitably color one's impressions about *perceived* support as well. The fact that grown-up children and their parents live together tells us little about the economic flows between the generations. It can even be argued that in the majority of cases the elderly parents were more than paying their way by retaining ownership of the property. In Tokugawa Japan, for example, the elderly widower or husband living with his children, adopted children, and servants ruled as a patriarch over a complex household in which he implicitly exchanged the rental of his property for labor services.[51] In America in the eighteenth century and early nineteenth

century, a bare majority of decedents died with some noticeable amount of personal and real estate, indirectly raising again the question of how great a share of them were not recipients of aid from their children.

These clues about the extent of actual old-age support serve to raise anew the question of how widely the old-age benefits of children are perceived. Young couples in the process of family formation may well heavily discount the putative old-age benefits, through ordinary psychological myopia, through a realization that the extra child may not survive them, and through a reasonable fear that extra births may drag down the ability of any one surviving child to give resources to his parents much later on. The old-age support hypothesis is in need of further testing. Yet it remains an unrefuted consensus view, one that is easily incorporated into the concept of relative child cost.

1.7 Shifting Prices

Any overview of the influence of economic development on relative child costs must supply information on how relative input prices have drifted as well as on how the weights in the child-input and alternative bundles have shifted. The clearest drift in relative prices relevant to relative child costs has been the rise in real wage rates, or the cost of an hour of human time in terms of all commodities. Even common unskilled labor has enjoyed a doubling and redoubling in its purchasing power, and average wage rates have risen even faster with the rise of average skills.

A natural subject of interest in relating wage movements to changes in fertility is whether the wage rates facing adult females have risen faster than those facing children during the course of economic growth. If they have, then the relative cost measure might use this information to quantify the extent to which this drift in wage structure has raised the costliness of children. The average-wage ratio of adult women to children has indeed probably risen, though apparently only through the obvious mechanism of the upward drift in adult skills. There are abundant isolated estimates of the ratio of adult female *unskilled* wage rates to the wage rates for generally unskilled children, both for agriculture and in industry. It is hard to find a trend in these estimates for unskilled wage rates, since they refer to children of different ages in different settings. And as long as the adult females and the children in question are really both unskilled, it is doubtful that there could be any sustained movement in the pay ratio of such close substitutes. It is safer to return to the obvious: the average skill levels of adult females have drifted up relative to those of teenagers, meaning that the wage rates attached to the time costs of an extra child have risen relative to those on the time contributed by the extra child.[52]

While the likely upward drift in the ratio of adult female to child wage rates clearly implies rising relative child cost with economic development, the clearer rise in *all* real wage rates has a different impact on child costs in the early and late phases of development. In the early phases, children are time supplying on balance, as in the survey data for the rural Philippines. In this context, the general rise of real wage rates *reduces* the relative cost of a child by magnifying his net time contribution relative to his net commodity cost. Yet at the later phases, as in the United States postwar data, children have become time-intensive and are made more costly by any further rises in real wage rates. We return to this implication in the next section, when pursuing the evidence on just when the shift from time-supplying to time-intensive children occurs.

Another relative price movement that would affect the relative cost measure would be a change in the price of food relative to luxuries. Since an extra child is invariably food-intensive and luxury-replacing, a rise in the relative price of food would raise child costs. Theory would tend to predict such a drift toward more costly food, as long as it presumes that the more rapid growth in productivity in the supply of luxuries than of food, rather than the demand-side tug-of-war between Engel effects of income growth and the food-favoring demand effects of population growth, dominates the terms of trade between food and luxuries.

The usual available wholesale and retail price indexes show no clear long-run trend in the ratio of food prices to luxury prices, at least in the United States and Japan. The ratio of food price indexes to various "all other" categories has had little net change since the early nineteenth century, despite a historical peak about 1910–14 and some wide fluctuations since. In urban Japan the relative price of food showed no prewar trend, rose moderately across the wartime era, and changed little across the 1950s and 1960s.[53] Taken at face value, the standard price indexes would imply that the food intensity of children has happened to be irrelevant to the course of fertility decline in the past.

The usual indexes are likely to be biased, however, in the direction of underestimating the relative decline in the price of luxuries. Luxuries other than the consumption of traditional personal services are generally "new goods" and goods experiencing considerable quality improvement over time. The usual price series fail to capture the effect of the arrival of newly available goods and of quality improvements. To follow the prices of a fixed bundle of goods over many years, the usual Laspeyres indexes must overlook those goods not existing in early years and those whose quality is changing. Thus indexes of the price of transportation will continue well into the age of the bicycle and automobile before adding these modes to the bundle. Indexes of housing costs will go to some lengths to follow rents on a fixed set of deteriorating dwellings;

new units are added to the bundle in due course, but their initial availability and higher quality are not allowed to pull down the overall rate of inflation. At the same time, urbanization, improved communications, and the rise of mail-order shopping greatly cut the seldom-measured information costs on most income-elastic goods. The noneconomist's hunch that exposure to new "goods aspirations" makes children seem costly would have a direct counterpart in a true measure of relative child cost if the data were available. In all likelihood, a decline in the cost of luxuries relative to staples, correctly measured, set in with the earliest stages of economic development and has proceeded ever since.

Another price ratio of possible relevance to fertility is the price of land relative to commodities and to labor. Little is known about the long-run trends in land scarcity, despite the natural Malthusian intuition that rising population densities should be accompanied by a rise in the price of land. Within urban areas, data from the United States and Japan show an unmistakable and almost monotonic rise in the price of land relative to the price of commodities. In postwar Japan, urban site values (not adjusted for capital investments in real estate) have skyrocketed at real rates of increase of about 17% per annum.[54] And since urban site values are far above rural ones, urbanization has shifted large shares of national populations toward locations charging a higher relative price for lot space and room area. Both of these trends, urbanization and the rise in urban site values, have contributed to an unmeasured upward drift in the relative cost of an extra child, since extra children are living-space-intensive, as one would expect and as noted above, even though they reduce their parents' total expenditures on shelter.

An issue deserving further investigation is the relationship of the relative price of rural land to the course of fertility in rural areas. Studies of United States rural fertility in the nineteenth century by Yasuba, Easterlin, Leet, and others have shown generally good raw and partial correlations between various measures of land availability and human fertility.[55] The measures of land availability have sometimes been land prices and sometimes been demographically derived measures of population density or "population pressure." If these neat empirical patterns have actually identified an underlying mechanism linking greater land scarcity to fertility decline, this is a very important result. It means that rising population pressure on the land tends to check itself by cutting rural fertility. Whether one believes in the hypothesis affects one's view of the future of population growth in currently developing countries.

Easterlin's interpretation of the land-scarcity correlation is that it indeed identifies a basic mechanism underlying rural decision-making about family size. The pattern is viewed as a reflection of the basic desire of prospective parents to be able to set their children up with assets like those they themselves possess, so that greater "population

pressure" puts pressure on them either to postpone marriage or to limit fertility within marriage. They have, in other words, an inheritance motive somehow tied to the availability of land, a motive presumed to outweigh the importance of children as potential old-age support.

It is not clear whether the empirical results warrant an interpretation couched in terms of land inheritance, or whether land scarcity would always have the effect of rural fertility ascribed to it in these studies. Land availability may simply have been a convenient proxy for the ratio of current to prior living standards in United States cross sections in the twentieth century. This interpretation is consistent with fertility's seeming to have been highest not in the initial settlement of raw frontier but in the next-least-settled areas. Gains in income prospects over prior incomes would have been highest not in the initial clearing of soil but soon thereafter when the high yields of the new lands were secured. If this is the real meaning of the nineteenth-century United States rural patterns, then they represent a rediscovery of the "relative-income" hypothesis and would not imply declining rural fertility as population fills up the land in developing countries unless income growth were decelerating.

The land-inheritance interpretation is essentially a relative-cost rather than a relative-income hypothesis. It argues that an extra child is viewed as land intensive, in the sense that a couple would tend to demand more acres of land if it had an extra child than if it did not. This has not been demonstrated. Nor could a simple correlation between farm size and family size confirm the land intensity, since the earnings of extra children may make it possible to work or buy more land.

If land defined in acres rather than value did not prove an important share of rural child-input bundles, then one could quantify the contribution of rising land values to relative child costs. One question to be answered first is, Relative to what is land said to be scarce in a way relevant to fertility? The tentative answer seems to be: relative to luxuries, which children replace, and to common labor, of which children are net suppliers in less developed rural settings. It is possible that land scarcity, thus incorporated into a relative-child-cost measure, has been an important preventer of births. This is possible because land has indeed been most scarce relative to luxuries, though not always relative to child labor,[56] in the rural areas with highest fertility. So says the United States rural cross section for the mid-nineteenth century. So also say the upward drifts in the price of land relative to luxuries, but not labor, in the United States between 1800 and World War I and in Japan since the 1880s. *If* the land-intensity of an extra child can be demonstrated sufficiently to reject suspicions to the contrary, then the relative-cost index will prove to be an analytical link between rising land scarcity and declining fertility. The empirical tasks have not been completed, however.

1.8 The Shift toward Time-Intensity

Given the rise in real wage rates with development, and the slight evidence that extra children shift from being time-supplying to being time intensive, it is important to add further documentation of this apparent shift. If it really occurred, it is important to get a better idea of when it occurred, in order to judge roughly when the upward drift of real wage rates might have stopped lowering and started raising the relative cost of an extra child.

One way of bringing additional evidence to bear on the issue of time-intensity is to settle for less direct evidence on the net time costs like those graphed in figures 1.2 and 1.4 above. Time-use studies probing the interior of households will be rare. We can find more abundant data, however, on net *earnings* effects, as proxies for true net *time cost* effects. It is likely that the evolution of the total time children contribute to their parents' households will parallel that of their earnings in the marketplace. And the net effect of an extra child on parents' paid work is, conveniently, more relevant to the issue of time intensity than the missing data on parents' total time inputs into the child.

It should be possible to gather several household surveys from developing countries giving breakdowns of household income among household members, allowing regressions to determine the contributions of children and their effect on the working hours of their parents. Their effect on parents' rates of pay can also be quantified if one can solve the issue of simultaneity between number of children present and parents' rates of pay.

Until surveys with income breakdowns by household member are analyzed, the only additional sources for currently developing countries are those simply reporting total household income and the ages and numbers of children present, plus variables other than income or family composition. Such data sets will show, for almost any less-developed country, that extra children, especially extra older children, are associated with higher total household income. One example of this kind of indirect evidence is a set of regressions run using survey data from Indian village surveys: Naurangdeshar, Rajasthan, 1968–69, and Ankodia, Gujarat, 1967–68.[57] The regressions, which could be repeated using any of several developing-country surveys, ran total income against the male head's age, his age squared, his literacy (Ankodia) or years of schooling (Naurangdeshar), the age and age squared of any adult male relatives present, value of land, tractor ownership, the value of other assets—and the number of children in each of several age-sex groups. The terms relating to children look at a glance like age profiles of net annual income contributions, rising with the child's age and significantly positive for males 16–25. The magnitudes also related to average household income and adult male earnings in proportions near the shares of the net

earnings effects shown for the Philippines in figure 1.4. While children thus appear time supplying and income increasing again in these Indian villages, this form of evidence remains vulnerable to the obvious charge of simultaneity. One could argue that the same results show that higher-income parents of given age and other attributes felt they could have more children and had them earlier.[58]

The more satisfactory kind of evidence, which at least breaks down household income by household member, can be gleaned from the earlier history of Europe and the United States. One such data source is the unusual survey taken of agricultural workers' families in England between 1787 and 1796 by the Reverend David Davies and Sir Frederick Morton Eden, just as the French Revolution, bad harvests (1795–96), food price inflation, and Malthus's first essay on population were beginning to work their effects on the English countryside.[59] Parish vicars and rectors were asked to find half a dozen or so families of agricultural laborers who were poor yet generally working enough to avoid extreme dependence on the parish. The purpose was to estimate family consumption, saving or dissaving, and sources of income. The sample was apparently defined by the income range of the male head (except for the observations on widows' families), which varied less than total family income. Considerable effort was devoted to accounting for all income despite the difficulties of estimating home production and to allocating this income to individual family members as far as practicable. The survey also yielded parish- and date-specific data on food and rent prices in most cases, allowing deflation of earnings by the price of a loaf of wheat bread or, in some cases, its price equivalent in wheat flour or oatmeal.[60]

Table 1.8 shows some apparent earnings effects of an extra child in an English agricultural laborer's family in the late eighteenth century. The figures are subject to several cautions. The effects of children on husbands' work and earnings could not be estimated, given the nature of the sample. Some of the children's earnings were reported only for the group of children, and in some cases only the ages of the oldest and youngest children were given, requiring some age interpolation based on the number of middle children.[61] And, despite the efforts of the interviewers, it is likely that some of the children's and wives' earnings were attributed to the husband, owing to the widespread practice of group home production (e.g., "husband earns 1s. 6d. a week weaving with spinning help by eldest daughter").

It appears from table 1.8 that a surviving third-born child would have been earnings supplying, though perhaps less so than the extra Filipino child hypothesized in figure 1.4 above. A third live birth might also have been a net supplier of earnings, though infant and child mortality was severe enough in that setting to make the net earnings effect of the extra birth hinge critically on one's choice of a discount rate. If one accepts

Table 1.8 **Children's Earnings and the Effect of Children on Wives' Earnings, 169 Agricultural Workers' Families, England, 1787–96**

A. Children's Earnings

Age	Average Earnings, Loaves/Year	Average Earnings, % of Adult Male Earnings	Estimated Number of Children
8	11.6	3.2	38
9	12.7	3.5	34
10	26.9	7.3	33
11	32.9	8.9	35
12	41.4	11.2	28
13	71.4	19.4	21
14	54.8	14.9	20
15	67.1	18.2	13
16–18	84.4	22.8	14
19–22	72.9	19.8	6

B. Wives' Earnings, by Number of Children and Age of Youngest

	Number of Children			
Age of Youngest Child	1 or 2	3	4	5 or More
0–1, or "infant" loaves	33.8	39.3	32.6	31.5
% of adult male	9.2	10.7	8.9	8.6
number of observations	12	21	20	35
2–5 loaves	56.7	42.0	41.4	45.9
% of adult male	15.4	11.4	11.2	12.5
number of observations	12	4	13	22
6 or older loaves	44.8	42.9	27.8	29.1
% of adult male	12.2	11.7	7.6	7.9
number of observations	13	3	3	1

C. Implied Effect of a Third-born on Mother's Earnings, Three-year Spacing

	Effect on Mother's Earnings	
Age of Third-born	Loaves/Year	% of Adult Male Earnings
0–1	−17.4	−4.7
2	−14.7	−4.0
3–5	− 2.8	−0.8
6–11	− 1.9	−0.5
12 up	0	0

Note: loaves/year = half-peck loaves of wheat bread (7.3 to 8.3 lbs) per year; adult male earnings = 368.1 loaves/year.

the further assumption that an extra child contributed more value in chore help (not counted as earnings in the survey) than he demanded from the (housebound) mother, then the time-supplying nature of a child in rural eighteenth-century England seems reinforced.

For later dates in England and America we have only scraps of information on the earnings effects of an extra farm or rural child. Reviewing the evidence for twentieth-century America elsewhere, I have found that an extra farm child was still a net supplier of earnings in the 1920s and not an earnings reducer or time intensive until about the 1960s.[62] The available shreds of information thus imply that rural children remained time supplying and earnings supplying throughout most of the course of economic development. If further investigation supports this tentative view, it appears that rural child costs are *reduced* by the upward drift in farm wage rates over most of economic development. This throws the burden of explaining the observed decline in rural fertility back onto other variables: taste-formation mechanisms, the cheapening of new luxury goods, possibly land scarcity, and so forth.

Within the rural sector, it would be worth while to pursue the issue of which economic activities most enhance the net time supply of a child, thereby possibly retarding fertility decline when real wage rates are rising. One obvious suspicion is that abundant opportunities for cottage industry and farm household by-employments, as flourished in Britain in the eighteenth and early nineteenth centuries and in Tokugawa and and Meiji Japan, raised the net time contribution of a child by raising his productive employment by more than his interference with the time use of adults.

The choice of crop may also have been a historically important influence on the economic benefits of children. So far, the one fairly clear pattern linking crop to reliance on child labor is that cotton agriculture is perhaps the major crop with the highest share of its labor performed by children, as well as being very intensive in the use of all labor per acre. The child-labor intensity of cotton has been noted by several observers of Egyptian agriculture since at least the 1940s.[63] The link between children and cotton has also been stressed in a study of the cotton areas of Texas in the 1920s.[64] It may be that forces stimulating a shift to cotton cultivation may buoy up children's earning power and even increase fertility for entire rural regions.

Outside of agriculture the transition from earnings-supplying children to earnings-reducing children came earlier, but still not until the late phases of economic development. Elsewhere I have presented data for United States industrial families' earnings patterns, tentatively concluding that the switch to earnings-reducing children, and presumably time-intensive children if all flows were measured, did not come until World War I or later.[65] Further regression results reported by Michael Haines

now appear to confirm that, as of the large United States government survey of industrial workers' families in 1889–90, children were still net earnings suppliers to their parents' households in a subsample from five West European countries as well as in the United States.[66] Only after the upward drift of adult skills and wartime demands for female labor had pulled much larger numbers of wives away from home did an extra child come to take more earnings and, presumably, total time from his parents than he supplied.

Within the industrial sector, there appears to be a pattern relating natural-fiber textiles to heavier net earnings effects for an extra child, whether in factories or in cottages. This is what observers thought about cotton mills and woolen mills in nineteenth-century Massachusetts and Lancashire, and about silk-spinning in rural homes in Meiji Japan. It is a pattern now seemingly confirmed by regressions run on the 1889–90 industrial workers' sample. These regressions find much heavier average earnings by children in cotton and woolen textile families than in the glass, ferrous metal, and mining industries, after allowing for the ages of children and wives, husband's relative income, and regional variables.[67] While the textile industries also made heavier use of adult female labor, their effect on the earnings lost by a mother owing to an extra child was smaller than their effect on child earnings. If this pattern is confirmed by studies on contemporary developing countries, it appears that specialization in textiles, like cotton agriculture, may be a force holding fertility up as wage rates advance in some textile-oriented economies.

Although the shift to earnings-reducing and time-intensive children remains somewhat uncertain, there is little doubt that it has occurred. Figure 1.5 brings this out by summarizing the earnings effects of an extra child in the home in four survey samples widely spread over time and space. In the postwar urban United States a firstborn child is clearly earnings-reducing, as already shown in figure 1.2 above. Yet in the other three settings, corresponding to earlier stages of development, extra children are earnings-supplying. As the dates in figure 1.5 also imply, the shift has come late in the development process. Just how late is an empirical question of considerable importance for forecasting fertility in developing countries.

1.9 Conclusions

1.9.1 Patterns

A careful and straightforward definition of the relative cost of an extra child holds considerable potential for organizing otherwise vague arguments about how changes in the economic environment should affect

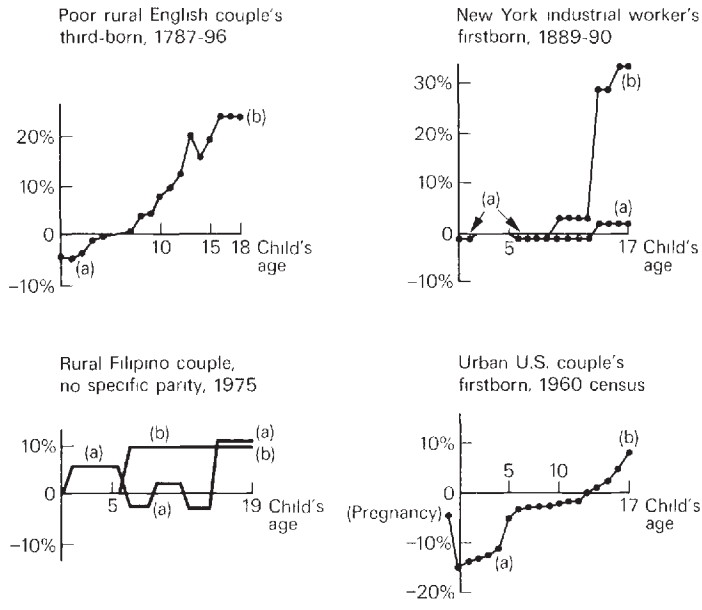

Fig. 1.5 Estimated effects of an extra child in the home on family members' earnings. Selected survey results. (*a*) net effect of the child on earnings of parents (— = loss; on mother's earnings only in England and New York); (*b*) child's own earnings. Vertical axes measure these effects as a percentage of average earnings of the adult males in the sample (in the United States, 1960, as a percentage of an adult male's annual earnings of $4,000).

Poor rural English couple's third-born, 1787–96; see table 1.8 and accompanying text. New York industrial worker's firstborn, 1889–90: see *FSA*, table 4–5 and app. B. The percentages are (*a*) ages 0–1: −2.0%, ages 2–5: 0%, ages 6–13: −1.1%, ages 14–17: 1.6%; and (*b*) ages 10–13: 2.3%, ages 14–15: 28.7%; ages 16–17: 32.5%. Rural Filipino couple, no specific parity, 1975: see fig. 1.4 and accompanying text. Urban United States couple's firstborn, 1960 census: *FSA*, tables 4–5 and E–1. The percentages are: (*a*) pregnancy: −4.7%, under 1: −16.5%, age 1: −13.6%, age 2: −13.2%, age 3: −12.6%, age 4: −10.9%, age 5: −5.1%, age 6: −3.1%, age 7: −2.6%, age 8: −2.3%, age 9: −2.0%, age 10: −1.8%, age 11: −1.5%, age 12: −1.3%, ages 13–17: −0.1%; (*b*) age 14: 1.0%, age 15: 2.5%, age 16: 5.4%, age 17: 8.3%.

fertility incentives. The relative cost concept also seems capable of contributing to our understanding of why fertility failed to decline in the early stages of so many countries' development, and it also partly explains the ultimate secular fertility decline.

Matching the relative cost concept with historical information on price and wage trends and on shifts in the net effects of a child on family allocations of home time and commodities suggests forces that steadily reduce fertility incentives throughout development and also forces whose incentive effect has reversed itself. From the earliest stages of modern economic development, likely declines in the prices of luxury goods relative to staples should have made children seem more costly, other things equal. Yet the implications of improvements in real wages and child survival rates would have had an opposite effect in the early stages of development. With children still time-supplying as defined here, early increases in real wage rates for common labor would have made children seem cheaper relative to the home activities with which they compete. It may have been, for example, that wage gains undercut the case for holding down family size in England's industrial revolution, as the dismal scientists advancing the iron law of wages feared. By contrast, in the later stages of development children have become time-intensive, especially outside of agriculture, translating further improvements in real wage rates into increasing awareness of the costs of a child in terms of the mother's career. As far as we can judge from crude comparisons of time-use studies across classes and nations, this shift to time-intensity has not been due to any marked rise in the gross time inputs into a child of given birth order and spacing. Rather, it has been due to the decline in child time contributions to parents' households and to the drift toward less time-intensive, more commodity-intensive alternatives to an extra child.

The relevant-cost concept is thus able to string together reasons for predicting an early lag in fertility decline as well as the later decline. There is thus at least preliminary support for not rejecting the third of three interpretations of the early persistence of high fertility offered above. This interpretation argues that succeeding generations of young couples may have exercised crude fertility controls all along and simply found no net new incentives to reduce births in the early stages of economic development. This interpretation remains a competitor with the view that couples never thought in terms of child costs and benefits until a development threshold was passed, and with the view that early development finally gave them the social and physical ability to have as many children as they wanted.

The evidence presented here is extremely fragmentary and falls far short of establishing that arguments about relative child costs, as defined here, unlock the many mysteries in fertility patterns over time and across

groups. It does indicate, however, the kind of evidence waiting to be pursued in the study of fertility in developing countries.

1.9.2 Child-Cost Proxies and the Identification Problem

The usefulness of the concept of relative child cost will depend on the availability of appropriate empirical proxies that allow one to isolate its influence on fertility without going through the tedious process of actually calculating the various time and commodity costs of children and alternatives to them. This paper has advanced several suggestions for choosing proxies, suggestions that can translate into choices of special interaction terms for fertility regressions.

At the "micro" level of samples consisting of individual households, the relative-cost concept is not likely to bring great changes in our choices or interpretations of independent variables. The relative-cost measure combines information about couples' economic environment that is not likely to be observable at the individual household level, except as a transformation on place of residence and some of the couple's attributes, such as schooling. Using, for example, the wage rate of the wife as a measure of the relative price of time inputs, or schooling as a proxy for lower-cost access to information about luxury goods and services, will accomplish little, since wage rates and schooling have already been surrounded by a host of competing interpretations in work on fertility.

The inability of the relative cost concept to untie Gordian knots at the "micro" level reflects not so much the limitations of the concept as the limitations of microtesting. Many of the questions bearing most directly on population policy are questions of how changes in the aggregate economic environment will affect aggregate fertility. The organizing issue of this paper, for example, was how economic development might affect aggregate fertility by changing the market signals facing whole groups. Similar in its aggregation and its reference to time-series analysis is the issue of the overall effectiveness of deliberate policies toward fertility. Micro cross sections often fail to yield answers to such questions by not letting the independent variables of interest vary and be measured.

For more aggregate testing on changes in fertility over time, where the units of observations are socioeconomic groups, regions, or nations, the relative cost can be proxied, though perhaps only part by part. Since group wage rate data are more often available than group data on prices for commodities, a logical starting place for proxying relative cost patterns is with interaction terms multiplying the earnings intensity of an extra child by the change in a real wage rate for the group or region or nation. For this purpose it would be desirable to proxy the earnings intensity by a gap between the change in the labor force participation of

wives caused by the presence of, say, a child under 6 and the participation rate for teenagers. Yet the participation rates for wives are seldom available by presence-of-children categories. One is likely to be forced further down the shopping list of suitable proxies. If it happens that there is evidence that only the real wage rate changes, and not the earnings intensity of an extra child, vary across groups, then the wage rate change alone proxies the change in relative cost. If not, one must look for further suitable participation-rate proxies, such as the rate for single young adult females (again versus that for teenagers). In a setting in which the earnings intensity of an extra child is suspected of varying, yet the only participation rates for women are overall age-group averages, the hunt for a time-cost proxy would have to be abandoned, since the overall female participation rate is simultaneously bound up with the dependent variable, fertility. In many cases, though, proxies can be had and may improve fertility forecasting.

Notes

1. A convenient overview of our eclectic consensus on how development cuts fertility is United Nations (1973, 1:88–106). Theorizing about the evolution of child costs and benefits with the development process goes back at least as far as Harvey Leibenstein's (1957) remarks on this theme. Stigler's lemma was enunciated by George Stigler (1969, p. 266) and helpfully cited (but not observed) by Donald N. McCloskey (1976, p. 434).

2. The Brownlee estimates in table 1.1 and figure 1.1 imply that the death rate in England and Wales fell dramatically from 1731–70 to 1780–1820. The dating of the decline in the death rate and age-standardized mortality rates remains the subject of debate, however, with some scholars putting the turning point as late as the 1810s and arguing that the birthrate may also have been higher in the late eighteenth century and early nineteenth century than is shown here.

3. On Tokugawa fertility rates, see Hanley and Yamamura (1977). Revised estimates of Meiji vital rates under varying assumptions about reporting biases are given in Morita (1963).

4. Habakkuk and Postan (1965, vol. 6, part 1, table 9); and Kuznets (1966, table 2.3).

5. A similar point was made by Kuznets (1975, p. 391). The present statements do not mean, of course, that literacy and urban residence did not reduce fertility among literate and urban households.

6. Deane and Cole (1969, chaps. 1, 2, 9).

7. Gilboy (1934); Bowley (1900); and Flinn (1974).

8. On national product per capita, see Bank of Japan (1966, parts 1 and 10). On real agricultural wages, see Ohkawa, Shinohara, and Umemura (1966–72, 8:135, 9:220). On industrial wage rates, see Minami (1973, pp. 306–8). Product per capita grew at 2% per annum or a bit less, depending on whose estimates one accepts in the controversy over rice production figures. The real wage rate for male day-hired agricultural workers grew at the following rates: 1886–88 to 1900–

1903: 2.84% per year; 1900–1903 to 1910–13: 0.54% per year; 1910–13 to 1924–27: 1.96% per year. Female wage rates in agriculture grew slightly faster. The real daily wage rates in manufacturing generally grew at the following rates calculated for female textile workers: 1900–1903 to 1910–13: 1.22% a year; 1910–13 to 1924–27: 3.60% per year.

9. Maddison (1971, app. A and B), reworking the production estimates of Blyn and Sivasubramonian.

10. Richards (1975, chaps. 3–5); O'Brien (1968).

11. Oechsli and Kirk (1975, p. 410). See also Kirk (1971); and Beaver (1975, chaps. 6–8). It should be noted that the fertility lag under discussion here is evident in the data reviewed by Oechsli and Kirk, even though their article advanced the view that the fertility transition is really more predictable and prompt among today's developing countries than others have suggested. Their deemphasis on the lag is made possible by the simple expedient of constructing "development indexes" standardized so that an index of zero is not achieved until the country has already experienced considerable increases in ten development indicators.

12. Tabbarah (1971, 1976); and Easterlin (1975).

13. Tabbarah's 1976 version of the model actually posits a rise in fertility as well as in completed surviving family size before the threshold is reached. This rise in fertility is hard to observe empirically, leaving it little support over the null hypothesis of no early change in fertility. Yet his model is easily altered to posit no change in maximum attainable births, a rise in child survival chances, and a decline in desired number of children.

14. For extensive citations to the estimates of absolute child costs and benefits, see chapter 4 of Lindert (1978), hereafter cited as *FSA*.

15. The role of the child-cost concept within a model of optimal fertility regulation with uncertain birth outcomes is shown more formally in *FSA*, chap. 3.

16. I assume that the parents expect to live until after their surviving children have left the home as adults.

17. If the family member in question does not in fact work for pay, then the shadow price of his time may of course differ from the market wage for working persons with his attributes. Yet, as shown elsewhere (*FSA*, chap. 4, n. 4), the choice of time price matters to the measurement of relative child costs only where it applies to family members whose paid work is in fact affected by the child's existence. This being the case, the relevant margins of time use here will be ones for which wage rates (plus possible effects of time allocation on future earning power) are the appropriate time prices.

18. Estimates of the positive effect of children on the working hours of postwar United States husbands are reviewed in *FSA*, appendix B. An estimate for the rural Philippines in 1975 is given in section 1.5 below.

It has not yet proved possible to quantify an effect of children on their fathers' pay rates per unit of time from cross-sectional data, because simultaneity in the relationship between husband's income and the number of children threatens to distort any measure of so subtle an effect. Panel data may help isolate this effect. Or an effect of children on a husband's wage rate could be quantified synthetically if one were to take the estimates of the effects on hours and then separately estimate the effects of hours upon the husband's rate of pay, ignoring any other effect from fatherhood to rate of pay.

19. A budget constraint of this type has been developed, for example, in Becker and Lewis (1973).

20. The term "quality" is more suggestive of child attributes, or of child "outputs" in the household-production-function framework, than of inputs into the

child. Even at that level, it invites unhelpful controversy by labeling as human "quality" such narrower observable attributes as schooling achievement and income potential.

21. See, for example, Caldwell (1968, chap. 6); Mainichi Newspapers (1972, chap. 1); and especially Fawcett et al. (1974).

22. Fawcett et al. (1974, appendix, especially tables A1, A2).

23. *FSA*, chap. 4, sec. 4.

24. *FSA*, app. E.

25. The calculations underlying tables 1.2 through 1.5 are laid out in *FSA*, app. A–E.

26. Houthakker (1957); and *FSA*, app. D.

27. Data on house purchases in New Haven, Connecticut, between 1967 and 1970 show that larger family size significantly raises the consumption of lot size and room space while lowering the consumption of location and other housing quality. See Goodman (1976, table 4.8); and King (1975, table 5.1). Several other studies have confirmed that more children lead to the consumption of more rooms despite the reduction in shelter expenditures, among them David (1962).

28. On patterns in child-care time in the United States and other countries, see the sources cited in *FSA*, chap. 4 and app. C, plus Walker and Woods (1976); Szalai (1972); Dodge (1966, pp. 91–99); Kingsbury and Fairchild (1935, chap. 13 and appendix); and the studies of rural Philippines, Java, and Nepal cited below.

29. Note that the estimated effects of a child on the mother's earnings are an average over many households. In some cases the appearance of, say, a firstborn child causes wives to drop out of the labor force and actually raises the amount of time they devote to nonchild home activities. In other cases the arrival of the firstborn merely takes some time of an already unpaid mother away from other home activities. It is the averaging of such cases that yields a time cost exceeding the effect of the child on parents' paid work.

30. *FSA*, chap. 5.

31. Conrad and Meyer (1958).

32. Evans (1962, pp. 208–14). It should be noted that Evans's estimates of slave life expectancy in 1850, which are the ones used by Fogel and Engerman (1974), are higher than any others given in Evans's secondary sources or in the life-table estimates of Eblen and Meeker.

33. Conrad and Meyer (1958); Evans (1962, pp. 214–21); Butlin (1971); and Fogel and Engerman (1974, vol. 1, chap. 3, and vol. 2, pp. 62–87).

34. The predicted values for slaves in the New Orleans slave market are those based on sales in the 1850s reported in Kotlikoff (1976, table 3; regression for the 1850s based on 775 group and individual sales). A 20-year-old was valued at $823.25, and 76.535% of newborns were estimated to survive to their 20th birth day in 1850.

35. The most promising historical data base on time use within rural households, outside the United States farm household surveys of time use from the 1920s on, is several of the zemstvo household surveys taken in prerevolutionary Russia. Those taken in Vologda and Volokolamsk, for example, seem to have separate time-use data on men, women, boys, and girls, to judge from their citation by Chayanov (1966, pp. 179–82). A guide to the contents of dozens of untapped zemstvo surveys is given in Svavitskii (1961, especially appendixes).

36. For a fuller description of the Laguna sample, see Boulier (1976); and Popkin (1976). I am grateful to Drs. Boulier and Popkin for making their tentative results available to me and for running several supplementary regressions.

In the calculations underlying figure 1.4, I have valued the time of family members at their income per hour worked at any productive task: P1.595 for husbands, P0.938 for wives, and P1.31 for working children. For adults, these averages, which partly reflect lower-paid home work, are below the market wage rates for jobs away from home: P1.89 for working fathers and P1.94 for working mothers.

37. The regressions run thus far have not been able to identify the (presumably higher) time costs of a "firstborn"; that is, of the only child present in the home at the time of survey.

38. The regressions run thus far do not reveal any clear net difference between the amount of time spent on the care of an extra preschool child by all persons between the Laguna survey and the time-use survey in Syracuse, New York, in 1967–68. Slight differences in methods of data collection and in model specification make such comparisons hazardous in any case.

39. Figure 1.4 implies that the child leaves home on his or her 20th birthday. It is difficult to know the modal or mean ages of home-leaving in the contemporary rural Philippines. The age of 20 was chosen because the Laguna sample happened to show very little dropoff in the numbers of children present by age until age 20. The choice of a hypothetical home-leaving age does not seem to matter greatly to the discussion of the net benefits derived from a child by his parents as long as children are more or less earning what they themselves consume in their teens and across their early twenties.

40. An extra child in a household already having children makes the father work an extra 3.16 hours a week in its first year, an extra 2.24 for ages 1–6, 0.12 hours less (i.e., no real effect) for ages 7–9, an extra 2.05 hours a week for ages 10–12, 0.17 hours less for ages 13–15, and an extra 5.23 hours a week for ages 16–19 (Boulier [1976, table IIC]). Multiplied by 52 weeks, thus ignoring seasonal effects, one gets a stronger effect than the 8–50 hours of extra work a year estimated for the father of a later-born child in various United States studies (*FSA*, app. B).

41. Preliminary unreported regressions showed no net effect of extra children on the hourly rate of pay for working mothers. This may be the result of (*a*) model misspecification, (*b*) a genuine lack of such an effect, and/or (*c*) the fact that the hourly rates of pay for different tasks were imputed rates at which outsiders would have to be hired to perform those tasks, rather than personal market wage rates facing the mothers.

42. The Lorimer scales, based on 1950 expenditure data from India, and given in Lorimer (1967) and cited in Mueller (1976, table II–1). On these scales, the average household composition in Laguna had 4.242 adult-equivalent consumption units. Assuming that consumption was 90% of reported income in the Laguna households would make each Lorimer "unit" cost P1221. This peso value was then applied to the age-and-sex -specific scales to estimate commodity inputs into the extra child.

43. Mueller (1976).

44. The data for the Javanese village, near Jogjakarta, were gathered and are currently being analyzed by Benjamin White, in his doctoral dissertation at Columbia. Those from Nepal were gathered by Robert Creighton Peet. I am indebted to Moni Nag for reporting the results used here in his paper cited in table 1.7.

45. In the Javanese village, all adults devoted only 2.0 hours a day to child care, or less than a quarter of the adult male work input average. These two hours of household child care time were spread across more than one child, but the number of children under 6 years is not reported.

46. Whether an extra child is a net economic asset to his parents in less developed economies may be as unclear to the parents as it is to scholars. Interviews with 1,497 males and 1,499 females in the partially urbanized Western and Lagos states in Nigeria in 1973 showed both sexes evenly divided in their responses to questions about the net asset issue:

Measure	*Response*	*Males*	*Females*
Whether another child would make the	Richer	32%	32%
parents richer or poorer	The same	44%	44%
	Poorer	25%	25%
Whether children who have reached	Yes, more	46%	30%
adulthood have returned more wealth	The same	16%	27%
than that spent on them (parents with	No, less	38%	43%
such children only)			

(Okediji et al. [1976, p. 127]). This suggests at least some conformity between what the cross-sectional estimates so far imply and what couples perceive, since it is hard to imagine contemporary United States couples' responding so neutrally about the net economic effects of an extra child.

47. Fawcett et al., *The Value of Children . . . Comparative Perspectives* (1974, table A5).

48. Mainichi Newspapers (1972, chap. 1).

49. Hohm (1975).

50. On the decline of intergenerational coresidence in the United States, see Stern, Smith, and Doolittle (1975); Beresford and Rivlin (1966); Taeuber and Taeuber (1971, table VI–7); and Edward Pryor's estimates from Rhode Island census data in Laslett (1972). On the intermediate patterns in industrial Lancashire in the mid-nineteenth century, see Anderson (1971, pp. 139–40).

On the more extensive coresidence in developing Asian countries, see Nag (1976); Kessinger (1974); and the chapters on Serbia and early Japan in Laslett (1972).

51. Smith (1959).

52. Another structural change raising the relative time cost of an extra child is the trend toward greater geographic separation of young couples from their relatives, a change that raises the transactions costs of purchasing child-care time in a way not revealed by the available wage series.

53. Adams (1944, pp. 33–34); U.S. Bureau of the Census (1976, vol. 1, chap. E); and Ohkawa et al. (1966, vol. 8).

54. Lindert (1974); Ohkawa et al. (1966, vol. 9); Bank of Japan (1966); Mills and Ohta (1976, p. 700).

55. Yasuba (1962); Easterlin (1971, 1976); Leet (1976).

56. Note that the empirical relevance of child wage rates to relative child costs is to be judged, in rural settings where children are net labor suppliers, by patterns in the purchasing power of labor time in terms of the inputs in which rural children are intensive—food (and possibly land). The contribution of wage-rate differences to fertility differences must thus begin by comparing wage rates with the prices of food. In the United States cross sections for the mid-nineteenth century, it is inappropriate to examine nominal wage rates across regions, as Easterlin has done (Easterlin [1976, pp. 61–62]). Wage rates without board must be compared with the cost of food, which was indeed lower in the frontier areas, leaving a positive correlation between the real value of a child's net labor supply and fertility.

57. The data are described and analyzed in Chernichovsky (1975, pp. 69 ff.). I am grateful to Dr. Chernichovsky for running additional unreported regressions on these data at my request.

58. In his paper for the present conference, Allen C. Kelley has reduced the simultaneity problem by applying two-stage least-squares regression techniques to survey data from urban Kenya in 1968–69. His structural equations show positive and sometimes significant effects of extra children of unspecified age on total family income (tables 2, 3, A–1, and A–2). This result at least resembles the result obtained by ordinary least squares from the two rural Indian villages, though differences in models and data bases obviously complicate the comparison.

59. Davies (1795); Eden (1797).

60. In a minority of cases it was necessary to use a bread or flour price for the same year from elsewhere in the same county or an adjoining county. The bread-flour-oatmeal price ratios were based on parishes reporting more than one of these prices.

61. My interpolations of the ages of middle-born children and allocations of children's earnings among the older children may have affected the age profile of children's earnings in unknown ways, but they would not affect the undiscounted average earnings at all.

62. *FSA*, chap. 4.

63. Richards (1975, citing 1943–44 data); Ghomeny (1953, table 26, citing alternative 1943–44 data); and Hansen (1969, p. 503, referring to the early 1960s).

64. "Children are the backbone of the labor supply . . . and in a large measure determine the extent of the cotton crop. . . . [About 45% of all workers are children, and] the median age of all child workers was only 11 years, 5 months" (Gibbons and Armentrout 1925, p. 30).

One source failing to confirm the child-labor intensity of cotton relative to other crops was the University of Nanking's massive farm survey of 1929–33. It failed to record a higher share of labor performed by children in the one locality (out of about 160) that specialized in cotton, or a higher share in several localities having a larger-than-average minority share of their area planted in cotton Buck (1937, chaps. 6, 8). This is not a very satisfactory test, since cotton was not heavily represented in the sample. More generally, however, the Buck *Statistics* volume remains an underutilized resource for studying the division of labor by crop and a host of other issues relating to peasant farm productivity and land tenure.

65. *FSA*, chap. 4 and app. B.

66. Haines (1976).

67. Haines (1976).

Comment Eva Mueller

Professor Lindert's paper is valuable in many ways. One cannot help admiring his ability to draw on data from many countries and many historical periods. The choice-theoretic framework he employs is an immense aid to logical thinking, even if one is critical of its narrow focus on economic variables. Lindert's major conclusion—that at early stages

Eva Mueller is professor of economics and research associate at the Population Studies Center, University of Michigan.

of development the value of children may rise because they may earn more income—is important and, I believe, correct.

Relative cost, the concept central to Lindert's paper, is merely a weighted price index. An advantage of this concept is that changes in weights can be ignored as long as there is reason to believe the weights change to the same extent in the numerator and the denominator. For example, I find myself in agreement with Lindert's assumption that the shares of "other goods" in the bundle of child inputs and the bundle of alternative inputs probably move in more or less parallel fashion. Thus, for rough comparisons, changes in quantities of goods inputs need not be measured. Relative changes in time inputs are much more problematic, as we shall see.

Rather than confining myself to relative cost, I will remark on changes in absolute costs of children in the course of development. Absolute cost is a much more comprehensive concept than relative cost. Rather than focusing exclusively on *prices*, it also focuses on *quantities* of time and other resources that must be sacrificed to raise a child (net of the time and resources derived from the child). Absolute cost is affected by the quality of child the couple chooses or feels it must have. It is a concept that helps us consider "taste" factors, such as the attractiveness of goods that are alternatives to children. Most important, absolute cost has important policy implications. If the net absolute cost of a marginal child up to the time of adulthood exceeds his contribution to household income, economic development is likely to be retarded by large family size, since the household's ability to accumulate physical and human capital is reduced. The noneconomic satisfactions of raising children may of course override absolute child costs, as far as the household is concerned; but parents may not be aware of the macroeffects of a society-wide preference for large family size on the economy and hence on their own family's chances of attaining a higher standard of living. In many less-developed countries governments are in a quandary when they must decide whether to pursue an energetic family planning program or adopt a politically expedient "do-nothing" stance on the family planning issue. As economists we have a serious responsibility to produce research that aids correct policy decisions. For this, absolute cost measurements are more useful than relative cost measurements.

Lindert himself seems intrigued with the question whether children are ever an economic asset, and he goes beyond the relative-cost framework to present some pertinent calculations. My own work (Mueller 1976) has made me skeptical of the proposition that children are an economic asset, and I emphatically share his desire for more data that might throw light on this problem. The question that needs to be answered is not whether children are ever an economic asset but, under

what conditions are children an economic asset and under what conditions are they an economic liability?

Let us consider *changes* in child costs during the course of development, without being constrained by the narrow focus of the relative-cost concept. We may think of two kinds of communities: type I is a stagnant, traditional community where there is little technological change, little accumulation of physical and human capital, and little unused land of acceptable quality. In this stagnant community the marginal productivity of capital and labor is very low (as T. W. Schultz argued years ago). Tastes are static. Type II is a community that is modernizing its agriculture or industries or both; the demand for labor and capital is growing; incomes are growing; a taste is developing for new kinds of goods and children of higher quality. Communities in less developed countries range on a continuum from type I to type II. Usually, within the same country, there are type I and type II localities as well as subgroups of the population.

Starting with labor, in a type I community wages and the marginal productivity of labor are low. An additional child reduces per capita income, thereby increasing the marginal utility of income. In consequence, the family is forced to engage in additional work that has very low productivity and that, in the absence of the child, would not be considered worth undertaking. There is increasing evidence of a positive correlation between part-time work by women and higher fertility among poor households (Smith 1976). Husbands may also work longer hours as family size grows, and children may share in the work. In this sense an additional child is time releasing; but it imposes a burden of additional work on the family that is an opportunity cost, since in the absence of the child the family would have preferred to work less.

As we move toward a type II community, the demand for labor and the productivity of labor rise. Thus there is an income effect on labor force participation and a price effect. The strength of the income effect depends on the culture and on the kinds of employment opportunities generated by development. In some LDCs, but not in others, work by women or children, especially manual work, is considered demeaning and a sign of low status. As income rises, therefore, women may work less. Urbanization and industrialization tend to reduce work opportunities for women, especially work that is compatible with child-rearing (Boserup 1970). When women do not want to work for a combination of reasons relating to social status and the characteristics of available jobs, market wages greatly exaggerate the cost of child-care time. If education is highly valued, increasing income may lower children's participation in the labor force. However schooling does not seem to interfere seriously with work by children until it is extended beyond ages

10–12. Thus the result of development may be that the mother has more time for child care, or the children work less, or both. To be sure, there are other type II communities where work by women and children does not have negative status implications. In that case the incentive effect of higher wages on labor force participation may outweigh the income effect. Children and women will then be more willing to engage in market work and children may be time releasing until a later stage of economic development.

In all, the transition from a type I to a type II community may have four combinations of consequences for labor force participation and hence for the cost of children:

1 { Mothers tend to work less → lowers child costs
  { Children tend to work more → lowers child costs

2 { Mothers tend to work less → lowers child costs
  { Children tend to work less → raises child costs

3 { Mothers tend to work more → raises child costs
  { Children tend to work more → lowers child costs

4 { Mothers tend to work more → raises child costs
  { Children tend to work less → raises child costs

In case 1 children become less costly, and fertility may be stimulated by development. Perhaps Egypt and some Latin American countries resemble case 1. Case 2 may be more common than case 1; here the effects of changes in labor force participation on child costs are mixed. Taiwan during the 1960s is an example. Case 3 also is mixed. In case 4 children become more costly and fertility is discouraged on that account. Contemporary Western communities are typical of case 4. The point is that the transition from type I to type II communities may be accompanied by diverse changes in work patterns. In consequence, the effect of development on child costs via work patterns and wages is not uniform for all countries. In the long run all type II communities may move toward case 4; how long this will take depends on cultural attitudes toward women's work, educational aspirations for children, and the kinds of jobs economic development opens up for women and children.

Turning now to the rate of return on capital, as a less developed community moves from type I to type II, it benefits from new methods of production and other innovations. Hence the demand for capital is increased. In a type I community a farmer may have little need for additional capital, and resources in old age may be as valuable to him as resources now. In a type II community the farmer may profit greatly if he has money to buy hybrid seeds, fertilizer, a water pump, and so forth; a small businessman may profit similarly if he can buy an electric motor. Thus children start to compete with capital accumulation. The discount rate rises and, since child costs are concentrated in the early

years and returns from children follow later, the cost of children rises relative to the "alternative H bundle." While the relative-cost framework in principle allows for a discount rate, it has the shortcoming that child costs are compared explicitly only with the bundle of alternative H services. The other possible trade-off—between the marginal child and a higher rate of capital accumulation—is neglected. High discount rates may not fully reflect the difficulty a farmer or artisan has in obtaining capital. Capital markets are imperfect in LDCs, and for the lower income groups access to capital is sometimes as much of a problem as exorbitant interest rates. Thus, while children may work more and at higher wages as development proceeds and therefore become cheaper, the opportunity cost of the funds required for their early upbringing is bound to rise.

Finally, changes in tastes need to be brought into the picture. In a type I community, a very limited assortment of H enjoyments is available. As the amount of traditional H services acquired increases, there may be diminishing marginal utility. Another child may be much more gratifying than an increase in the alternative H bundle. When new consumer goods become available and education for children is desired, the attractiveness of the trade-off is altered. To be sure, this is a taste rather than a price effect. Nevertheless, in the eyes of parents the marginal child becomes more costly because the things that must be sacrificed for it are more highly valued in type II communities.

In sum, in the course of development the growing demand for capital and new consumption aspirations make children more costly, while rising wages and increasing employment opportunities may raise or lower child costs. The total effect of development on child costs depends on such factors as social attitudes toward work by women and children, the kind of jobs the particular economy creates for women and children, the characteristics of the capital market, and the availability of new consumer goods. Further, it depends on the extent to which type II conditions have penetrated the economy. In Mexico, for example, in spite of a relatively high per capita income, the poorer segments of the population still live under close to type I conditions.

Returning briefly to Lindert's method, a major advantage of the relative-cost concept is that it lends itself to comparisons that range widely over time and space. This is interesting; but it seems that studies that compare distant times and widely differing geographic areas and cultures do not deserve high priority in future research. Research to date suggests that the kind of economic variables that enter our models have only limited power to explain fertility change. Noneconomic factors and structural characteristics of the economy play a large role and interact with economic variables. Hence we need very intensive microlevel studies that explore how economic factors help explain differences in fertility

decisions between households that share the same culture, and where the remaining differences in the social and economic environment can be explicitly taken into account in the analysis.

In addition, studies of perceived costs deserve some attention. I agree with Lindert that actual movements in absolute and relative child costs are major determinants of changes in perceived costs. However, measures of perceived cost would not give us exactly the same information as measures of actual costs. First, there is bound to be a time lag between changes in actual and perceived costs; and changes in some costs may be perceived more quickly than changes in some other costs. Since time lags are the most puzzling, as well as the most crucial, aspect of the demographic transition, any data that throw light on time lags are of interest. Second, as Lindert suggests, studies of perceived costs may help us learn which parts of the actual costs and benefits of children are salient to couples and which ones they tend to overlook. Third, perceived costs and benefits are affected by a couple's time horizon and time preference—matters we can only guess about when we work with traditional economic data. Last, while perceptions of costs and benefits reflect to some extent economic and demographic factors that can be measured directly, they also reflect a variety of environmental influences that often cannot be brought into the analysis in a more direct way. Thus it appears that much might be learned from studies of perceived costs and benefits, especially if data on actual and perceived costs could be collected for the same population.

References

Adams, T. M. 1944. *Prices paid by Vermont farmers . . . 1790–1940; Wages of Vermont farm labor, 1780–1940*. Burlington, Vt.: Vermont Agricultural Experiment Station.

Anderson, Michael. 1971. *Family structure in nineteenth century Lancashire*. Cambridge: Cambridge University Press.

Bank of Japan, Statistics Department. 1966. *100-year statistics of Japan*. Tokyo: Bank of Japan.

Beaver, Steven E. 1975. *Demographic transition theory reinterpreted: An application to recent natality trends in Latin America*. Boston: Lexington Books.

Becker, Gary S., and Lewis, H. Gregg. 1973. On the interaction between quantity and quality of children. *Journal of Political Economy* 81, no. 2, part 2 (March/April): S279–88.

Beresford, John C., and Rivlin, Alice M. 1966. Privacy, poverty, and old age. *Demography* 3:247–58.

Boserup, Ester. 1970. *Woman's role in economic development.* New York: St. Martin's Press.

Boulier, Bryan L. 1976. Children and household economic activity in Laguna, Philippines. University of the Philippines, Institute of Economic Development and Research, Discussion Paper no. 76–19 (29 July).

Bowley, Arthur W. 1900. *Wages in the United Kingdom in the nineteenth century.* Cambridge: Cambridge University Press.

Buck, John Lossing. 1937. *Land utilization in China: Statistics.* Chicago: University of Chicago Press.

Butlin, Noel G. 1971. *Ante-bellum slavery: A critique of a debate.* Canberra: Australian National University, Research School of Social Sciences.

Caldwell, John C. 1968. *Population growth and family change in Africa.* Canberra: Australian National University Press.

Chayanov, A. V. 1966. *The theory of peasant economy.* Homewood, Ill.: Richard Irwin.

Chernichovsky, Dov. 1975. Fertility behavior in developing economies: An investment approach. Ph.D. diss., City University of New York.

Collver, O. Andrew. 1965. *Birth rates in Latin America.* Berkeley: University of California Press.

Conrad, Alfred H., and Meyer, John R. 1958. The economics of slavery in the ante-bellum South. *Journal of Political Economy* 66, no. 2 (April): 95–122.

David, Martin H. 1962. *Family composition and consumption.* Amsterdam: North-Holland.

Davies, David. 1795. *The case of labourers in husbandry.* London.

Deane, Phyllis, and Cole, W. A. 1969. *British economic growth, 1688–1959.* 2d ed. Cambridge: Cambridge University Press.

Dodge, Norton T. 1966. *Women in the Soviet economy.* Baltimore: Johns Hopkins University Press.

Easterlin, Richard A. 1968. *Population, labor force and long swings in economic growth.* New York: Columbia University Press.

———. 1971. Does human fertility adjust to the environment? *American Economic Review* 61, no. 2 (May): 399–407.

———. 1975. An economic framework for fertility analysis. *Studies in Family Planning* 6, no. 3 (March): 54–63.

———. 1976. Population change and farm settlement in the northern United States. *Journal of Economic History* 36, no. 1 (March): 45–75.

Eden, Sir Frederick Morton. 1797. *The state of the poor.* Original ed. Vols. 2 and 3. London: J. Davis.

Evans, Robert, Jr. 1962. The economics of American Negro slavery. In *Aspects of labor economics*, ed. H. Gregg Lewis. Princeton: Princeton University Press.

Fawcett, James T., et al. 1974. *The value of children in Asia and the United States: Comparative perspectives.* Institute Paper no. 32. Honolulu: East-West Population Institute.

Flinn, Michael W. 1974. Trends in real wages, 1750–1850. *Economic History Review* 27, no. 3 (August): 395 ff.

Fogel, Robert W., and Engerman, Stanley L. 1974. *Time on the cross.* Boston: Little Brown.

Ghomeny, M. R. 1953. Resource use and income in Egyptian agriculture. Ph.D. diss., North Carolina State University.

Gibbons, Charles E., and Armentrout, Clara B. 1925. *Child labor among cotton growers of Texas.* New York: National Child Labor Committee.

Gilboy, Elizabeth W. 1934. *Wages in eighteenth century England.* Cambridge: Harvard University Press.

Gille, Halvor. 1967. Twentieth-century levels and trends of fertility in developing countries. In *World population conference, 1965.* New York: United Nations Department of Economic and Social Affairs.

Goodman, Allen C. 1976. Neighborhood effects, hedonic prices, and the residential housing choice. Ph.D. diss., Yale University.

Habakkuk, H. J., and Postan, M., eds. 1965. *Cambridge economic history of Europe.* Vol. 6, part 1. Cambridge: Cambridge University Press.

Haines, Michael R. 1976. Industrial work and the family cycle, 1889–1890. Paper given at the annual cliometrics conference, Madison, Wisconsin, 24 April.

Hanley, Susan B., and Yamamura, Kozo. 1977. *Economic and demographic change in preindustrial Japan, 1600–1868.* Princeton: Princeton University Press.

Hansen, Bent. 1969. Employment and wages in rural Egypt. *American Economic Review* 59, no. 3 (June): 298–313.

Heer, David M. 1968. The demographic transition in the Russian Empire and the Soviet Union. *Journal of Social History* 1, no. 3 (Spring): 193–240.

Hohm, Charles F. 1975. Social security and fertility: An International perspective. *Demography* 12, no. 4 (November): 629–44.

Houthakker, Hendrik S. 1957. An international comparison of household expenditure patterns, commemorating the centenary of Engel's law. *Econometrica* 25, no. 4 (October): 532–51.

Kessinger, Tom G. 1974. *Valyatpur, 1848–1968: Social and economic change in a north Indian village.* Berkeley: University of California Press.

King, A. Thomas. 1975. The demand for housing: Integrating the roles of journey-to-work, neighborhood quality, and prices. Conference draft of his paper by the same title in *Household production and consumption*, ed. Nestor Terleckyj. NBER Studies in Income and Wealth, vol. 40. New York: Columbia University Press.

Kingsbury, Susan M., and Fairchild, Mildred. 1935. *Factory, family, and woman in the Soviet Union.* New York: Putnam.

Kirk, Dudley. 1971. A new demographic transition? In *Rapid Population Growth*, ed. National Academy of Sciences, pp. 123–47. Baltimore: Johns Hopkins University Press.

Kotlikoff, Laurence J. 1976. Toward a quantitative description of the New Orleans slave market. Paper presented at the annual cliometrics conference, Madison, Wisconsin, 23 April.

Kuznets, Simon. 1966. *Modern economic growth.* New Haven: Yale University Press.

———. 1975. Fertility differentials between less developed and developed regions: Components and implications. *Proceedings of the American Philosophical Society* 119, no. 5 (October): 363–96.

Laslett, Peter, ed. 1972. *Household and family in past time.* Cambridge: Cambridge University Press.

Leet, Don R. 1976. The determinants of the fertility transition in antebellum Ohio. *Journal of Economic History* 36, no. 2 (June): 359–78.

Leibenstein, Harvey. 1957. *Economic backwardness and economic growth.* New York: Wiley.

Lindert, Peter H. 1974. Land scarcity and American growth. *Journal of Economic History* 34, no. 4 (December): 851–81.

———. 1978. *Fertility and scarcity in America.* Princeton: Princeton University Press.

Lorimer, Frank. 1967. The economics of family formation under different conditions. In *World population conference, 1965*, vol. 2 New York: Department of Economic and Social Affairs.

McCloskey, Donald N. 1976. Does thc past have useful economics? *Journal of Economic Literature* 14, no. 2 (June): 434–61.

Maddison, Angus. 1971. *Class structure and economic growth: India and Pakistan since the Moghals.* New York: W. W. Norton.

Mainichi Newspapers, Population Problems Research Council. 1972. *Summary of eleventh national survey on family planning.* Tokyo: Mainichi Newspapers.

Mills, Edwin S., and Ohta, Katsutoskh. 1976. Urbanization and urban problems. In *Asia's new giant*, ed. Hugh Patrick and Henry Rosovsky, p. 700. Washington, D.C.: Brookings Institution.

Minami, Ryoshin. 1973. *The turning point in economic development: Japan's experience.* Tokyo: Kinokuniya Bookstore.

Morita, Yuzo. 1963. Estimated birth and death rates in the early Meiji period of Japan. *Population Studies* 17, no. 1 (July): 33–56.

Mueller, Eva. 1976. The economic value of children in peasant agriculture. In *Population and development*, ed. Ronald G. Ridker. Baltimore: Johns Hopkins University Press.

Nag, Moni. 1976. Economic value of children among Javanese and Nepalese peasants: An anthropological inquiry. Revised draft of a paper presented to the annual meeting of the American Association for the Advancement of Science, Boston, 18–24 February.

Nassef, Abdel-Fattah. 1970. *The Egyptian labor force.* Philadelphia: University of Pennsylvania Population Studies Center.

O'Brien, Patrick. 1968. The long term growth of agricultural production in Egypt, 1821–1962. In *Political and social change in modern Egypt*, ed. P. M. Holt, pp. 162–95. New York: Oxford University Press.

Oechsli, Frank W., and Kirk, Dudley. 1975. Modernization and the demographic transition in Latin America and the Caribbean. *Economic Development and Cultural Change* 23, no. 3 (April): 391–419.

Okhawa, K.; Shinohara, M.; and Umemura, M. 1966–72. *Estimates of long term economic statistics of Japan since 1868.* 12 vols. Tokyo: Tokyo Keizai Shinpo Sha.

Okediji, F. O.; Caldwell, John; Caldwell, Pat; and Ware, Helen. 1976. The changing African family project: A report with special reference to the Nigerian project. *Studies in Family Planning* 7, no. 5 (May): 126–36.

Popkin, Barry M. 1976. The production of child welfare in rural Filipino households. University of the Philippines, Institute of Economic Development and Research, Discussion Paper no. 76–17 (July).

Population Reference Bureau. 1976. *1976 world population data sheet.* Washington, D.C.: Population Reference Bureau.

Postan, M. M., and Habakkuk, H. J., eds. *The Cambridge economic history of Europe.* Vol. 6. *The industrial revolutions and after.* Cambridge: Cambridge University Press.

Richards, Alan R. 1975. Accumulation, distribution and technical change in Egyptian agriculture, 1800–1940. Ph.D. diss., University of Wisconsin, Madison.

Smith, Stanley. 1976. The interaction between female labor force participation and fertility in Mexico City. Ph.D. diss., University of Michigan.

Smith, Thomas C. 1959. *The agrarian origins of modern Japan.* Stanford: Stanford University Press.

Stern, David; Smith, Sandy; and Doolittle, Fred. 1975. How children used to work. *Law and Contemporary Problems* 39, no. 3 (summer): 93–117.

Stigler, George. 1969. Does economics have a useful past? *History of Political Economy* 1 (fall): 217–30.

Svavitskii, N. A. 1961. *Zemskii podvornye perepisi.* Moscow: Gosstatizdat.

Szalai, Alexander, ed. 1972. *The use of time.* The Hague: Mouton.

Tabbarah, Riad. 1976. Population education as a component of development policy. *Studies in Family Planning* 7, no. 7 (July): 197–201.

———. 1971. Toward a theory of demographic development. *Economic Development and Cultural Change* 19, no. 2 (January): 257–76.

Taeuber, Irene B., and Taeuber, Conrad. 1971. *People of the United States in the twentieth century.* Washington, D.C.: GPO.

United Nations, Department of Economic and Social Affairs. 1973. *The determinants and consequences of population trends.* New York: United Nations.

United States Bureau of the Census. 1976. *Historical statistics of the United States, colonial times to 1970.* Washington, D.C.: Government Printing Office.

Walker, Kathryn E., and Woods, Margaret E. 1976. *Time use.* Washington, D.C.: American Home Economics Association.

Yasuba, Yasukicki. 1962. *Birth rates of the white population in the United States, 1800–1860: An economic study.* Baltimore: Johns Hopkins University Press.