Economic Growth, Inequality and Population Growth

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1. The Malthusian Model

The Malthusian model is rightly celebrated as a remarkable achievement in social science. What is less appreciated is that Malthus wrote his first monograph explicitly to answer Condorcet and Godwin's claims about the perfectability of the position of mankind. Malthus's population theory was put forward to explain why the economic situation of the average person does not and cannot continue to improve indefinitely. Population theory, in effect, was an intermediate product in the goal of explaining the path over time of average income and wages.

You will recall the Malthusian model has two principal assumptions. A presumption of diminishing returns to increases in the level of population—that is, to increases in the amount of employment—because land and other capital are fixed. The negative relation between population and marginal productivity gives, so to speak, a demand function for population. The supply function is determined by the response of fertility and mortality to changes in income. When wages are relatively high, population grows more rapidly because the average persons marries earlier and has more children and also because child and other deaths are lower when families are richer.

The Malthusian model determines a long-run equilibrium wage rate when technology and preferences with regard to family size are constant over time. This wage is determined by the point on the positively inclined population supply curve where the average family wants to have two children that survive into adulthood (or $\dot{p}=0$ in Figure 1). Give the wage rate consistent with a stationary population, the demand function determines the long-run population level, as at p_0.

An important property of the Malthusian model is that the equilibrium wage rate is stable with regard to various shocks that push the system out

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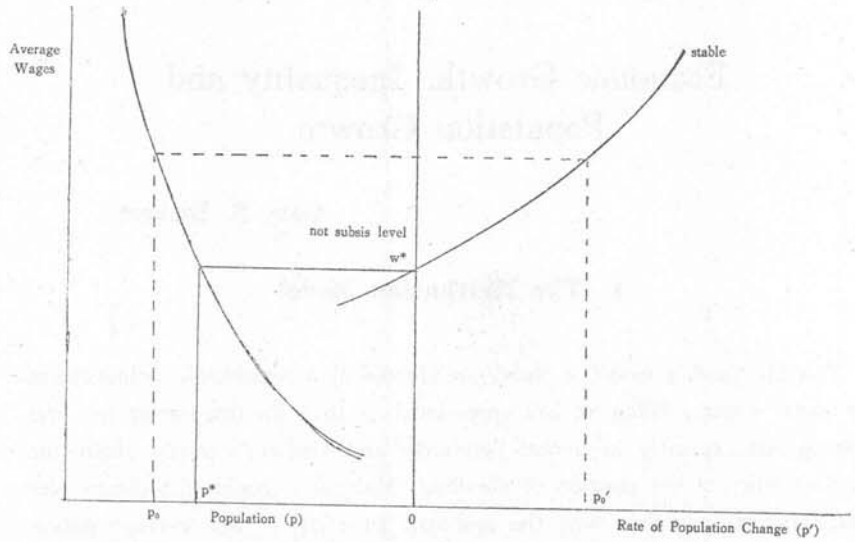


<Fig. 1> Relation Between Average Wages and Population in a Malthusian Model

of equilibrium. For example, suppose that an infectious disease destroys a good fraction of the population, as the Black Death episodes destroyed perhaps 30 percent of some European populations during the fourteenth century. The decline in population to p_0 raises short-run wages to w_0 through the diminishing productivity assumption. However, an increase in wages reduces mortality and encourages families to have more children, partly through earlier marriage. As a result, population begins to grow rapidly, as at p_0. The increase in population over time lowers the short-run equilibrium wage rate back toward the stationary wage (w^*), which in turn leads to a slower rate of growth in population. Ultimately, both the wage rate and the level of population are restored through this dynamic process to their long-run equilibrium levels.

Population did grow more rapidly and wage rates did rise after the Black Death episodes. However, powerful forces over time brought wages back to their long-run equilibrium. For example, wage rates do not appear to have increased in England from 1550 to 1800. Prior to the nineteenth century, the Malthusian model appears to work reasonably well for many countries.

But it does badly in explaining growth in Europe, North America and many parts of Asia during the nineteenth and twentieth centuries. Incomes per capita have continued to grow with no evidence of retardation even in

the rates of growth. Though age of marriage did fall over time as countries got richer, fertility rates also began to fall, not rise and the rate of fall has continued unabated for more than a century in the U.S. and many other countries.

2. The Neoclassical Model of Growth

Probably as a result of this failure of the grand dynamics of Malthus, economists lost interest in growth during the first half of the twentieth century. A neoclassical model began to develop during the 1950's that in certain respects differed radically from the Malthusian model. The neoclassical model added capital as a factor of production along with labor and it assumed that an increase in population did not lower the marginal productivity of labor if capital increased proportionately. That is, this model replaced the assumption of diminishing returns to scale by an assumption of constant returns to scale in aggregate labor and capital.

More significantly, the neoclassical model abandoned the emphasis on population dynamics as controlling long-run equilibrium incomes, which is the heart of the Malthusian model. Indeed, the neoclassical model assumes that population growth is exogenous and does not respond to changes in the economy. Hence, in this model, the economy and population change do not interact. Exogenous changes in the rate of growth of population growth change equilibrium income, capital-labor ratios and other variables, but changes in the latter do not affect the rate of growth of population.

Like the Malthusian model, the neoclassical model also implies a stable long-run equilibrium level of per capita income when both technology and preferences are stable over time. The equilibrating mechanism in the neoclassical model is changes in the amounts invested in capital rather than the Malthusian changes in the rate of growth of population. Desired investment is determined by a comparison of yields on capital-as measured by the real interest rate-with the rate of discount in utilities on future consumption relative to present consumption. Interest rates are negatively related to the captal-labor ratio because the marginal productivity of capital is lower when capital is relatively more abundant. The capital labor ratio is in equilibrium when the interest rate equals the rate of time preference after the latter is adjusted for the exogeneous rate of growth of population.

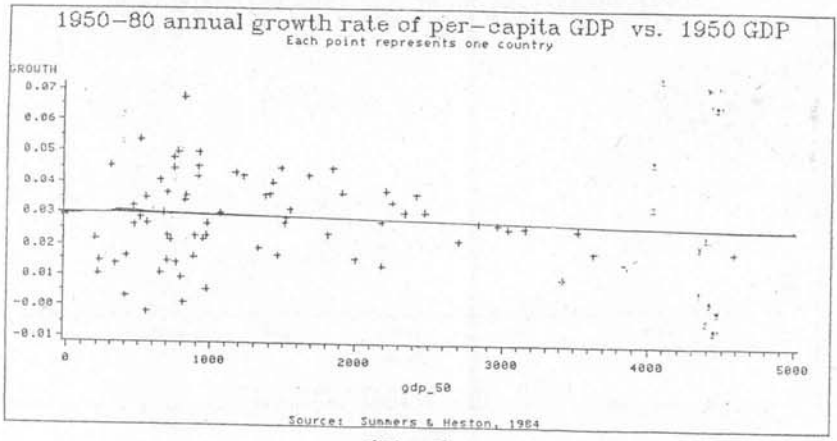
The neoclassical dynamics operate in a manner similar to the dynamics of Malthus, except that investment in capital rather than in children is the adjusting variable. If the capital-labor ratio exceeds the equilibrium ratio, the market interest rate would be below the equilibrium interest rate. This discourages investment in capital, which given an exogenous growth in population, would lower the capital-labor ratio over time. Conversely, if the capital-labor ratio is below its equilibrium level, market interest rates would exceed their equilibriun level, and investment would be relatively high.

Despite the elegance of the neoclassical model, many of its implications are grossly inconsistent with the available evidence. The most obvious is the prediction of a stationary long-run level of per capita income, whereas many countries have had persistent growth in per capita income for over a century. Of course, the neoclassical model adds exogenous technological change to explain the growth in per capita income, but the need to make the change "exogenous" is a confession of failure to explain the growth in income within the model.

A related difficulty is the implication that countries with the same technology and the same preferences converge over time to the same level of per capita income. Stated differently, countries that start with a relatively high per capita income would regress down toward the equilibrium income level, whereas countries that start with a relatively low per capita income would regress up toward the equilibrium level.

A study sponsored by the World Bank collected reasonably good data on the growth in incomes between 1950 and 1980 for over 70 countries. If the rate of growth between 1950 and 1980 in gross domestic product per capita is regressed on its 1950 level, the R^2 is only .0025, and the coefficient on GDP in 1950 is very small (negative) and statistically insignificant. A scatter of these data is shown in Figure 2. There is obviously a great variability in growth rates among countries that is not explained by initial income levels. More significantly for present purposes, there is no evidence in these data of regression to the mean. Moreover, data for over 120 countries from 1960 to 1980 even shows some tendency for regression away from the mean. During this period, richer countries grew somewhat more rapidly than poorer countries.

Comparisons over a long periods of time may be greatly biased by the



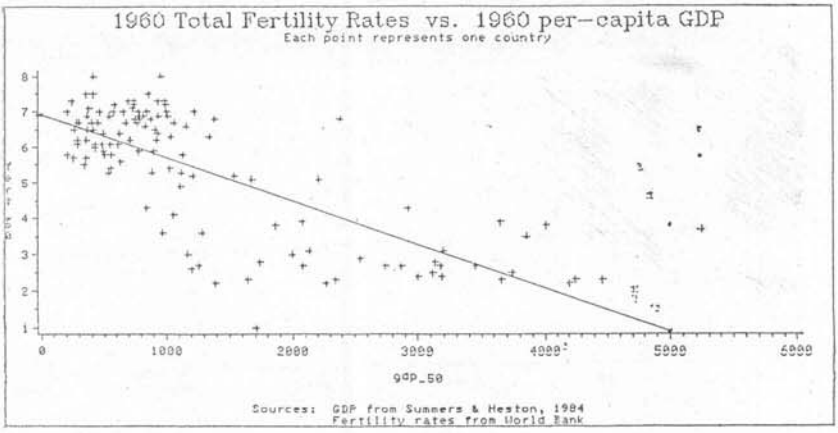
<Fig. 2>

nonrandom and limited number of countries that have available data. For what it is worth, however, Kuznets' comparison of long-term rates of growth finds no evidence of convergence between developed countries and a small sample of less-developed countries. Indeed, he concludes, "Over the last century to century-and-a-half per capita product grew much more rapidly in the presently developed countries [than in presently undeveloped countries]."

If an earthquake or war destroyed part of a country's capital stock, the neoclassical model implies not simply that the country eventually returns to the same equilibrium capital-labor ratio, but also that it returns to the same trend line of aggregate income. The latter implication follows because of the assumption that the rate of population growth is unaffected by changes in the economy. Yet some studies indicate that various macroeconomic time series typically do not follow a fixed trend path: shocks that say reduce aggregate income permanently lowers the trend level of aggregate income.

The assumption that fertility and other components of population growth are unaffected by changes in the economy is patently contradicted by the evidence. Figure 3 shows for 1960 a very strong negative relation between a country's level of per capita income and its fertility rate, especially between fertility in developed countries and fertility in less developed countries.

Although the neoclassical and the Malthusian models are in some respects



<Fig. 3>

quite different, the Malthusian model shares these difficulties of the Neoclassical model. The Malthusian model also cannot explain persistent growth in per capita income, the lack of convergence in per capita incomes of richer and poorer countries and the random walk character of the trend in aggregate output or income. Indeed, the Malthusian prediction of a positive relation between fertility and per capita income is even less consistent with the strong negative relation that actually exists than is the neoclassical prediction of no relation.

3. A New Approach to Fertility and Population Growth

Perhaps because the neoclassical model has as much difficulty as the Malthusian model in explaining these important facts about growth, the economics profession rather quickly became disenchanted with the neoclassical model. The excitement reflected in the perhaps hundreds of papers that extended and elaborated this model in the 1950's and 1960's gave way in the 1970's and 1980's to an almost total disinterest in the analytics of growth. The profession returned to the disinterest in economic growth that prevailed during the first half of this century.

It is possible, however, to begin the process of getting a powerful and highly relevant model of growth by combining the best features of the neoclassical and Malthusian models. The neoclassical approach is right to emphasize the importance of capital accumulation and to drop the assump-

tion of diminishing returns to scale. Malthusians are right in stressing that fertility and other components of population growth respond to changes in the economy, and that these responses in turn have greatly influenced developments in the economy.

But the Malthusian model seriously errs in concentrating on income effects and ignoring the consequences of changes in the cost of children. At least in modern economies children are expensive and the total cost of rearing them changes when the value of parents' time changes, or when governments subsidize or tax children.

The Malthusian model also assumes that number of children is the only dimension of children that is relevant to parental decisions. Yet especially in modern economies, parents can vary expenditures on children, through variations in the amount spent on child care and on the human capital of children. Therefore, capital is relevant not only in producing output, but also in modelling fertility decisions of parents through their choice of the amount invested in the human capital of children and the amount of bequests provided children. In other words, parents are interested in the quality as well as quantity of their children, and decisions about quality interact with decisions about quantity.

Quality of children can be introduced into the analysis in several ways that are equally good for present purposes. I will rely on the approach used in several papers recently coauthored with Robert Barro and Nigel Tomes. This approach assumes that parents are altruistic toward their children. The assumption of parental altruism is realistic for the vast majority of families and also provides a powerful approach to the analysis of fertility decisions. Moreover, this is possibly the most important consideration for present purposes and parental altruism provides a convenient way to link fertility to economic growth and inequality.

I assume that parents care about their own consumption, the number of children they have, and the utility of each child, as in the following equation:

$$U_t = v(c_t) + a(n_t) n_p U_{t+1}$$

where c_t is the consumption of parents, n_t is the number of children, and U_t is the utility of each child. The term $a(n_t)$ measures the degree of altruism toward each child; that is, the importance to parents of the utility of each child. The degree of altruism per child would tend to be negatively

related to the number of children if parents receive diminishing utility from additional children.

Decisions of parents are constrained by their resources, which depends on the capital they inherit (K_t) and earnings from their labor (w_t). Parents spend their resources either on own consumption, on the costs necessary to rear children (β), or on bequests to children in the form of human or physical capital (k_{t+1}). The budget equation is given by the following:

$$(1+r_t)k_t+w_t=c_t+n_t(\beta_t+k_{t+1})$$

The cost of rearing each child presumably is positively related to the value of parents' time (measured by w_t). The relationship between k_{t+1} and k_t determines the change over time in the amount of capital per person.

Parents maximize their utility by choosing optimal values of their own consumption, the number of children and the bequest to each child. They maximize utility taking into account the cost of rearing each child and the dependence of their utility on the utility of their child. This analysis has many implications about the behavior of fertility that are explored fully in my joint work with Barro. Here I only consider a few that are relevant to an analysis of economic growth and inequality.

An increase in the cost of rearing children reduces the demand for children because children become more expensive. This result is no more than an example of the law of negatively inclined demand curves and it is hardly surprising. However, a reduction in the number of children in turn reduces the shadow cost or price of bequests since a given bequest per child is in an economic sense cheaper when there are fewer children to give bequests. The decreased cost of bequests per child when the number of children decreases is an example of the interaction between the quality and quantity of children that holds in all models when these two dimensions of children are considered. The interaction reflects the special properties of the quantity and quality of children in the budget constraint. It does not require the implausible assumption that these two dimensions of fertility are particularly good substitutes in preferences.

A rise in the cost of rearing children may reflect a tax on children, introduced in recent years with a vengence by India and mainland China. Therefore, I expect a tax on children not only to reduce fertility, but also to increase investments in the human capital of each child and in the bequests and gifts given to each child.

A social security system is essentially a tax on the young to finance transfer payments to the elderly. Such a tax on the young has the same effect on the net cost of children to altruistic parents as does a direct tax on rearing children. Therefore, this analysis implies that a social security system would reduce fertility even when children do not support elderly parents and actually receive bequests from their parents.

Since a decline in fertility increases the amount of capital bequeathed to each child through the interaction between the quantity and quality of children, a social security system would raise, not lower, the average amount of capital accumulated by the average person. This is the opposite of the result obtained from life-cycle models of savings and is more extreme than the so-called Ricardian Equivalence Theorem.

Suppose that the wealth of parents increases, perhaps because they inherit more capital. Of course, this raises their own consumption. It also raises their fertility since the marginal utility of an additional child increases relative to the marginal utility of wealth to parents. Therefore, fertility would be positively related to parental wealth, just as in the Malthusian model. However, the model of fertility based on parental altruism also implies, through the quality-quantity interaction, that the increase in fertility would discourage be quests of capital to children. That is, wealthy parents would bequeath less capital to each child than they would have bequeathed if they did not increase their fertility.

4. Economic Growth in a Modified Neoclassical Malthusian Model

To develop the implications of this modified neoclassical-Malthusian model that incorporates utility maximizing decisions by altruistic parents, I assume an aggregate production function with constant returns to labor and capital. Later on I discuss some misgivings about this way of modeling production. One can show with weak assumptions about preferences and the production function that at least one feasible steady state exists, where fertility is constant. Then population, aggregate income and the aggregate capital stock all grow at the same constant rate.

Suppose that the capital-labor ratio and income per capita were above their steady state values. The higher income level would raise fertility

above its steady state value. Since an increase in fertility discourages bequests of capital to children, the capital-labor ratio in the children's generation would be driven below its value in the parents' generation. That is, the interaction between the quality and quantity of children forces the capital-labor ratio, income per capita and other variables to return to their steady state levels.

The stablizing force due to this interaction is an addition to the neoclassical stablizing force that works through the effect of changes in the capital-labor ratio on interest rates and the incentives to invest in capital. As a result, the approach to steady state equilibrium would be more rapid than in the neoclassical model. Indeed, the combined stabilizing forces can be so powerful that the steady state equilibrium is reached in one generation, no matter how large the initial deviation is.

Furthermore, the quantity-quality interaction can produce long cycles in fertility and the capital-labor ratio, cycles that are not possible in the Malthusian or one-sector neoclassical models. Long cycles occur if the elasticity of the degree of altruism with respect to the number of children decrases as the number of children increases.

In the 1920's the Russian economist Nikolai Kondratief suggested that capitalist economies exhibit long-term fluctuations of approximately fifty years duration in outputs and prices. Simon Kuznets later argued that the long-term fluctuations are much shorter, approximately twenty years in duration. If long-term fluctuations in income and other measures exist—it is not obvious that they do—they might well be linked to fertility since fluctuations in fertility are biologically related to the length of a generation. In a study published in the 1960's, Richard Easterlin presented empirical evidence of a link between long-term fluctuations in the economy and fluctuations in fertility and migration.

Since fertility responds to changes in per capita income, aggregate income does not return to a given long-run growth trend when shocks alter temporarily productivity or the capital-labor ratio. For example, a war that reduces the capital-labor ratio below its steady state value also reduces fertility below its steady state value. Although the economy ultimately returns to given steady state levels of per capita income, fertility and the capital-labor ratio, the population level would be permanently lower. This reduces the trend of aggregate income below its trend prior to the war.

Consequently, our modified growth model is more consistent with the empirical evidence on the time-series behavior of aggregate output than are the Malthusian and neoclassical models taken separately.

With some further modifications, the behavior of fertility would also be the source of persistent growth in per capita income in a country and its behavior would explain why all countries do not converge toward a common level of per capita income. The principle modification is to incorporate the substitution effect on fertility of changes in the capital-labor ratio. Since wage rates and the cost of rearing children move in the same direction as the capital-labor ratio, the cost of rearing children is above its steady state value when wage rates are, and it is below its steady state value when wage rates are below. If the substitution effect is more powerful than the income effect—evidence in the fertility literature suggests this to be the case—then fertility and the rate of population growth would actually fall when income per capita rises above its steady state value and they would rise when income per capita is below its steady state value.

Consequently, our model of utility maximizing behavior explains the negative relation in Figure 3 between a country's per capita income and its fertility rate through a stronger substitution effect from an increase in income and the value of time. Since all studies show that children require considerable time and energy inputs from parents, this conclusion is not at all surprising.

Such an interpretation of the negative relation between fertility and income is not novel. What has not been appreciated is that a negative relation between fertility and income may destablize a steady state growth equilibrium and cause persistent growth in per capita income. If a war or other shock that raises the capital-labor ratio and wage rates above their steady state values reduced fertility sufficiently, the capital bequeathed by the initial generation to each member of the next generation may even exceed the high levels of the initial generations because low fertility induces high investments in each child. If this occurred, the negative response of fertility to an increase in income would cause the economy to deviate further from the steady state.

In other words, the steady state equilibrium would be unstable rather than stable. Shocks in either direction would produce further increases or decreases in per capita incomes and capital intensity. With a positive shock,

per capita incomes would either grow indefinitely or they would grow until a stable steady state equilibrium were reached that had possible much lower fertility and much higher per capita incomes than the unstable steady state.

This analysis implies that countries with good luck would enter a region where they "take off" into an extended period of growth with rising per capita incomes. Similarly, countries with bad luck would get pushed further into declining per capita incomes and greater poverty. The developing countries would experience declining fertility that provides the impetus for further development through its effect on the per capita accumulation of capital, while countries that are mired in poverty would have high rates of fertility and low levels of capital accumulation.

Therefore, our modified neoclassical-Malthusian model can explain why some countries have protracted periods of rising per capita income without having to postulate exogenous technological improvements. Moreover, the per capita incomes of different countries would not converge to a common level, but would diverge over time as some countries take-off into growth from an unstable steady state, others remain stuck with low levels of per capita income and still others may have declining per capita incomes as they retreat further into poverty.

Notice that there is no convergence to a common per capita income even though interest rates and hence the incentive to invest are lower in richer countries than in poorer countries. Weaker incentives in richer countries to invest are more than offset by the effects of lower fertility on the desire to accumulate capital through the interaction between the quality and quantity of children. Therefore, a negative relation between income and fertility can give richer countries a powerful advantage in the accumulation of additional capital that would result in a growing discrepancy between the per capita incomes of rich and poor countries.

The decline in fertility as a country develops implies that mother's time would be reallocated out of household activities. Similarly, the accumulation of human capital implies that development would lead to a reallocation of the time of young men and women from work into school and other training activities. Therefore, we can explain why teenagers leave the labor force and married women enter it as a country develops.

Anyone comparing India, Vietnam, North Korea and mainland China with Japan, Hong-Kong, Taiwan, South Korea or Singapore would appre-

ciate the importance of public policies in promoting or retarding economic development. It is surely no accident that the latter countries have developed rapidly while generally promoting private enterprise and exports, while the former countries have developed slowly while promoting socialism, collective ownership and internal markets. Any useful model of economic development must imply that public policies can have major effects on the prospects for development. I do not have the time to elaborate, but in the modified neoclassical-Malthusian model presented in this talk, even small changes in public policies can dramatically affect the likelihood of achieving persistent growth in per capita income.

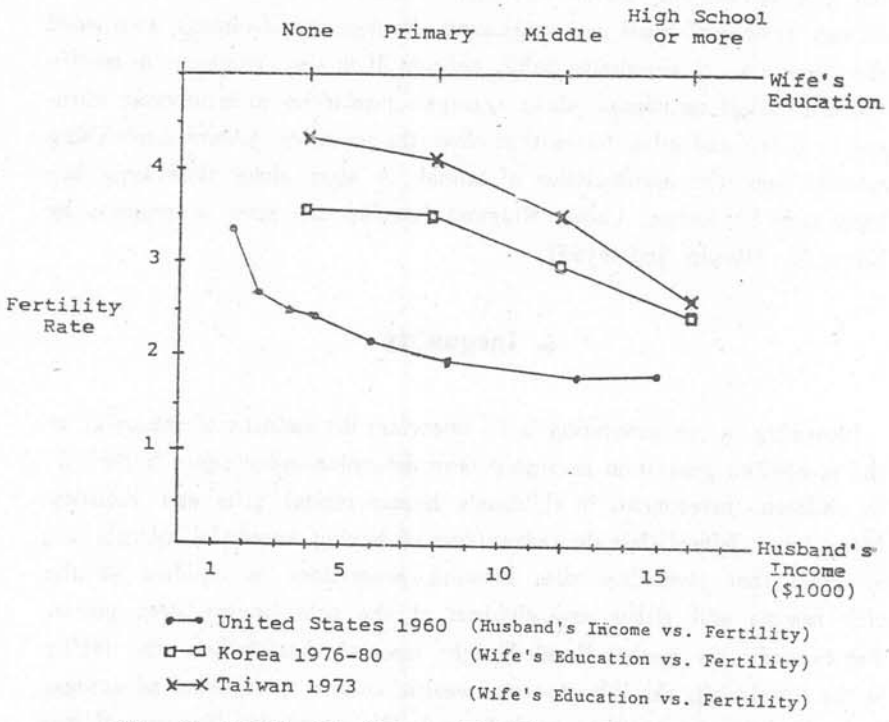
The endogeneity of fertility—in particular, the negative relation between fertility and per capita income—is one reason why the modified neoclassical-Malthusian model is far more consistent with the evidence on growth and development than either the neoclassical or Malthusian models alone. I do believe that the response of fertility is an important factor in development, but it is not the only reason why some countries do and others do not take off into periods of rapid and continuing development. I already mentioned the importance of permissive public policies. It is also necessary to modify the neoclassical assumption about aggregate production to incorporate learning by doing and other forces that offset the tendency toward diminishing returns from the accumulation of capital. A start along these lines has been made by Romer, Lucas, Kingand Rapello and work in progress by Kevin M. Murphy and myself.

5. Inequality

Inequality in one generation is an important determinant of inequality in the succeeding generation because parents determine endowments "inherited" by children, investments in children's human capital, gifts and bequests. Many have claimed that the advantages of having successful parents are so great that inequality rises between generations as children of the rich become still richer and children of the poor become even poorer. For example, my teacher Frank Knight asserted that "where the family is the social unit, the inheritance of wealth, culture, educational advantages and economic opportunities tend toward the progressive increase of inequality ..." (1935, p.50).

Children of the rich obviously have certain advantages in the race for wealth and achievement. Not only do their parents have more resources to provide for their education and other training, but their parents tend to be more able and more educated than average. Moreover, investments in the education and training of children from richer families tend to have relatively high rates of return because children of well-endowed parents tend to have above average endowments.

Along with these "natural" advantages, children of richer parents receive an "artificial" advantage through the negative relation between fertility and parental income. Figure 4 plots the relation between fertility and income or fertility and education among different families in the United States, Taiwan and Korea. Although the relation flattens out at higher income levels, it is strikingly negative at low and medium income levels. Fertility is negatively related to parental income partly because the cost of rearing children is greater to parents with more valuable time. This



<Fig. 4> Relationship Between Fertility and Husband's Income or Wife's Education

negative substitution effect apparently dominates the positive effect on fertility of higher incomes. The argument here is similar to the argument used to explain why fertility declines as a country gets richer. The lower fertility of richer families induces them to invest more in each child through the interaction between quality and quantity of children.

Given these many advantages to children from richer families, Knight's assertion about growing inequality and the richer getting richer across generations seems eminently reasonable. Yet this assertion is sharply contradicted by the available evidence. Figure 5 shows the relation between the earnings of fathers and sons for the United States and four European countries. It is clear that in these countries one generation eliminates most of the advantages of having rich parents and two generations eliminates essentially all of the advantages. The old saying, "from shirtsleeves to shirtsleeves in three generations is sharply confirmed by these data, at least for Western countries. As early as the fourteenth century, the Arab historian and philosopher, Ibn Khaldûn said, "Prestige is an accident that affects human beings. It comes into being and decays inevitably.... It reaches its end in a single family within four successive generations...as a rule, no dynasty lasts beyond the [span] of three generations."

These results indicate that families within a country converge rapidly over time to a common level of earnings. Therefore, the forces producing convergence within a country are much stronger than those producing convergence across countries since the evidence for countries does not show any convergence. One important force that operates between families but not among countries is regression to the mean between parents and children in abilities and in other endowments. Children of successful parents are not as able or otherwise as well-endowed as their parents and children of unsuccessful parents tend to be better endowed than their parents. Abilities and other endowments of husbands and wives also regress to the mean due to imperfect sorting in the marriage market. Children from successful families tend to choose spouses that are less well endowed than they are, which raises the regression to the mean in the endowments of their children.

Free schooling and other redistributive public policies decrease the advantages of coming from richer families. The effect of family background on the education of children declined over time in the United States as subsidies

Location and Son's Year	Father's Year	Variables: Dependent	Variables: Independent	Variables: Other	Coefficient	t	R^2	N	ε	Author
Wisconsin: 1965~67	1957~60	*E*	*IP*	None	.15	8.5	.03	2069	.13	Hauser, Sewell, and Luttrman(1975)
·	1957~60	Log *E*	*IP*	None	.0006	10.6	.05	N.A.	.09	Hauser (in press)†
1974	1957~67	Log *E*	Log *IP*	None	.28‡	15.7	.09	2493	.28	Tsai (1983)†
United States. 1981~82	1981~82	Log *E*§	Log *E*§	None	.18	3.7	.02	722	.18	Behrman and Taubman(1983)
United States:										
1969 (young white)	When son was 14	Log *H*	Log I_3	‖	.16	3.2	···	1607	.16	Freeman (1981)
1966 (older white)	When son was 14	Log *H*	Log I_3	‖	.22	7.3	···	2131	.22	Freeman (1981)
1969 (young black)	When son was 14	Log *H*	Log I_3	‖	.17	1.9	···	634	.17	Freeman (1981)
1966 (older black)	When son was 14	Log *H*	Log I_3	‖	.02	0.4	···	947	.02	Freeman (1981)
York. England:										
1975~78	1950	Log *H*	Log *W*	None	.44	3.4	.06	198	.44	Atkinson (1981)
1975~78	1950	Log *W*	Log *W*	None	.36	3.3	.03	307	.36	Atkinson (1981)
Malmö, Sweden.										
1963	1938	Log *I*	*ICD*	None	.08	1.8	.19	545	.17″	de Wolff and van Slijpe (1973)
					.12	2.4	.19	545	.13	
					.69	10.9	.19	545	.79	
Geneva. Switzerland.										
1980	1950	*IHH*	*IHH*	None	.31	4.1	.02	801	.13	Girod (1984)
Sarpsborg. Norway.										
1960	1960	Log *I*	Log *I*	None	.14	1.2	.01	115	.14	Soltow (1965)

NOTE.—ε=elasticity of son's income or earinings with respect to father's income or earnings; *E*=earnings; *H*=hourly earnings; *I*=income; I_3=income in three-digit occupation; *ICD*=income-class dummy; *IHH*=household income; *IP*=parents' income; *W*=weekly earnings.

· First 5 years in the labor force. † Also Robert M. Hauser (personal communication, October 2, 1984). ‡ Adjusted for response variability. § Adjusted for work experience. Sons with work experience of 4 years or less were excluded. The regression was weighted so that each father had equal weight. ‖ Work experience, three dummies for region of residence at age 14, five dummies for type of place of residence at age 14, and a dummy for living in one parent/female home at age 14.

The elasticities are values between pairs of income classes

〈Fig. 5〉 Regressions of Son's Income or Earnings on Father's Income or Earnings in Linear, Semilog and Log-linear Form

to schooling and other public expenditures on children rose.

Such regression to the mean in endowments and the equalizing effects of public policies are apparently powerful forces between families in a given country, but such forces do not operate strongly between countries. Therefore, it is not surprising that convergence in incomes is much stronger among families within a country than among countries.

For these reasons and perhaps many others, I believe that the common analogy between the rise and fall of families and the rise and fall of countries is much overdone. The momentum from success or failure is apparently far more important to countries than to families within a country.

6. Conclusions

This paper tries to demonstrate that fertility decisions and other family behavior are important in generating economic growth. Demographic responses are not as crucial as in the Malthusian model, where fertility and mortality are the decisive determinants of per capita incomes. However, the influence of the family on growth is far greater than that allowed in the neoclassical model of growth, where fertility and other family behavior hardly matter.

The modified neoclassical-Malthusian model developed in this paper explains several well known regularities about growth. Among the most significant are the absence of convergence over time in the per capita incomes of different countries, the strong negative relation between fertility rates and a country's per capita income, and the permanent effect of even temporary shocks on the trend of aggregate income and other macro series.

The modified model presented in this paper does not incorporate learning by doing and other forces that offset diminishing returns from the accumulation of capial. When these forces are combined with those highlighted in the modified model, there will be a very promising approach to the analysis of growth.

It is probably not surprising that inequality within a country is decisively related to the behavior of families. I show that the obvious forces which give children from richer famlies great advantages in the generation of earning and other income are offset by apparently more powerful forces. These include regression to the mean in abilities and other endowments, and

redistributive public policies. Although children from richer families do earn more than children from poorer families, the differences are much smaller than the differences in the earnings of their parents. Put differently, the tendency to converge or regress to the mean is far stronger for different families across generations in the same country than for the average incomes of different countries.

One message of this paper is that the emerging field of family economics is relevant not only in understanding changes in the family, such as the growth in divorce rates during the past twenty years or the rapid decline of fertility rates in many countries. Family decisions are also a crucial determinant of general economic changes, including the two most overriding social issues; the rate of economic growth and the degree of economic inequality. It is because Malthus saw some of the links between growth and the family that I assign him a great position in the history of the development of economic thought.