



Population and economic development

D. Gale Johnson, Ph.D.*

*Office of Agricultural Economics Research, The University of Chicago, 1126 E. 59th Street,
Chicago, IL, 60637 USA*

Abstract

The traditional view has been that population growth has adverse effects on real per capita incomes. China's restrictive population policy appears to have been based on the traditional view. There is substantial evidence that contradicts the conclusion that population growth is adverse to economic growth. Most empirical analyses of the relationship between population and economic growth do not find that there is an adverse effect. The history of the world has been that periods of low population growth have been periods of low economic growth and that high rates of economic growth have occurred when population growth is also high. Most of human history has had low population and low economic growth. Only recently has there been both rapid population and economic growth. © 1999 Elsevier Science Inc. All rights reserved.

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In recent years there has been a reconsideration, primarily by economists, of the traditional view that population growth has adverse effects on economic development.¹ The view that population has a tendency to grow too fast and to press against the capacity of a country to provide adequately for its people has existed for centuries, long preceding Thomas Malthus. (Malthus, 1992) The scholar, Tertullianus, writing some 1800 years ago, stated: "The greatest evidence of the large numbers of people: we are burdensome to the world, the resources are scarcely adequate to us; and our needs straiten us and complaints are every-

¹ Although there were numerous contributors to the reconsideration of the role of population in economic development, there are three that merit particular attention. Two were reports of the U.S. National Academy of Sciences (1971 and 1986). The first was *Rapid Population Growth: Consequences and Policy Implications*, issued in 1971. The committee was chaired by Roger Revelle. This report received less attention than it deserved as a contribution to the reconsideration of the interrelations between population and economic growth because the summary or overview did not accurately reflect the balanced presentation of the report. The second National Academy of Sciences report was *Population Growth and Economic Development: Policy Questions*, issued in 1986. It was chaired by Ronald D. Lee and D. Gale Johnson. The third important contributor to the discussion was the late Julian L. Simon, whose *The Ultimate Resource* was published in 1981 (Simon, 1993).

* Corresponding author. Tel.: (773) 702-8252; fax: (773) 702-8490; E-mail address: dg-johnson@uchicago.edu (D.G. Johnson)

where while already nature does not sustain us. Truly, pestilence and hunger and war and flood must be considered as a remedy for nations, like a pruning back of the human race becoming excessive in numbers” (Holland, 1993, p. 329). At the time this was written, the world’s population was approximately 200 million.

The reconsideration of the traditional view of the negative relationship between population growth and economic development supports the conclusion that population growth has little or no effect on the rate of economic growth in the short and intermediate run, and that in the long run, population growth may contribute to faster economic development.

1. The traditional view

The traditional view of the relationships between population growth and economic development need not accept the gloomy projections of Thomas Malthus’ first edition,² namely that the growth of population continuously pressed against the growth of the food supply and all that held population in check were vice and misery. All the traditional view requires is that a higher rate of population growth results in a slower rate of growth of measures of well-being, such as real per capita income or life expectancy.

If population is considered as an exogenous variable—one that influences economic growth but is not influenced by it—the most common of the modern models of economic growth results in the conclusion that an increase in population or the labor force will result in a decline in the real wage rate or real per capita income. This conclusion results from three assumptions.

The first is the law of diminishing returns when a factor of production is increased and all other factors are held constant. The second assumption is that total investment is independent of population.³ The third is that the rate of productivity change is independent of population. The second and third assumptions have been called into question by recent empirical analysis and by the development of the new growth theory (Romer, 1986 and 1990; Lucas, 1988). The

² In the second and subsequent editions of his *An Essay on the Principles of Population*, he significantly modified the alarmist views that he expressed in the first edition. In the first edition, population could be held in check only by vice and misery: starvation, disease, or war. In the second edition, after noting the recent growth of population in Europe, he wrote: “. . . fewer famines and fewer diseases arising from want have prevailed in the last century than in those that preceded it. On the whole, therefore, though our future prospects respecting the mitigation of the evils arising from the principle of population may not be so bright as we could wish, yet they are far from being entirely disheartening and by no means preclude the gradual and progressive improvement in human society which, before the late wild speculations on the subject, was the object of rational expectations.” (Malthus, 1992, pp. 330–331). In a quite remarkable conclusion that is just now being studied, he notes that “. . . everything depends upon the relative proportion between population and food, and not on the absolute number of people,” and then adds that he believes “. . . that countries which possessed the fewest people often suffered the worst from the effects of the principle of population” (Malthus, 1992, p. 330). A recent study (Burkett, 1999) finds that countries with the highest density of population in the early years of this century have had the highest rates of economic growth, thus confirming Malthus’ insight that a country can have too few people.

³ An implication of the assumption that total investment is independent of the population is that an increase in population will reduce the amount of capital per worker and thus the marginal product of each additional worker will be less than that of the previous worker.

views of policy makers in China with respect to the relationships between population and economic development seem to have been derived from a model or set of assumptions similar to those noted above. In discussions of population, there are repeated references to the limited availability of land and other natural resources. Such references clearly imply an acceptance of diminishing returns: output from land will increase by less than the increase in the amount of labor that may be applied to it. The position of Chinese policy makers calls into question one assumption of the modern growth model and arrives at an even more pessimistic conclusion regarding the adverse effects of population growth. That model is neutral regarding the effects of an increase in population (i.e., more children) on investment. Efforts to limit the growth of China's population have been justified on the grounds that the high cost of raising children reduces investment. This is an important conclusion, and we now consider whether it is supported by the available evidence from China and other countries.

2. What do children cost?

Minister Peng Peiyun quantified the cost of additional children in a statement made in 1993: "The absolute number of births is very large; the numbers for 1991 and 1992 are both over 20 million. One-fourth of the rise in national income each year has been consumed by the newborns. This has become a heavy burden on socioeconomic development of the country. China is the most populous country in the world, one characterized by a big population, limited cultivable land per capita, a poor economic foundation, and relatively insufficient resources per capita" (Peng, 1993, p. 402). If national income were to increase at approximately 10% annually, Minister Peng has estimated that each year newborns absorb 2.5% of the national income.⁴

Children could adversely affect the economic development of a country if the cost of providing for the children reduces the rate of investment. If the cost of the children comes out of consumption expenditures, then there would be no noticeable effect on economic growth or development—parents substitute expenditures benefiting a child for expenditures that they would otherwise have made for themselves. Total consumption expenditures remain unchanged.

What are the facts? Are the costs of children borne by their parents or do they represent a claim against investments made to increase the economy's productivity? Let us look at what

⁴ A similar statement may be found in *China's Economy in 2000* by four scholars at the Chinese Academy of Social Sciences: "The objective of not exceeding 1.2 billion by the end of the century was based on these premises. To maintain the total within 1.2 billion, the annual birth rate may not exceed 9.4 (per thousand). At the present natural growth rate (14.55 per thousand in 1982), the population at the end of the century will be 1,316 million, 116 million more than the projected figure. Raising these children will cost upwards of 255 billion yuan, which means that the increase in the gross output value of industry and agriculture at the end of the century will be 10% less than the anticipated figure, and the average increase in personal income will be 20% less, due to decreased production and the larger population. These figures do not include the increased demand on accumulation funds which will result from providing employment for new members of the labour force" (Liu et al., 1987, p. 296).

This argument rests on the assumption that the cost of children comes out of investment funds. This is only asserted, not proven. No evidence was given to support the assumption.

the Chinese data tell us. A comparison of birth rates or the number of babies in the previous decade with the percentage of the gross domestic product invested for the period since 1972 reveals that neither the birth rate nor the number children 10 years or younger had any effect on the percentage of the gross domestic product that was invested. In other words, as the birth rate declined or the number of children declined, the percentage of China's gross domestic product (GDP) saved or invested has not increased. Regressions of the percentage of GDP invested on lagged birth rates or the number of children were not statistically significant. The absence of a relationship is shown in Table 1. For example, for the period 1972 through 1975, 35.6% of GDP was invested; the lagged birth rate was 34.3 per thousand, and the number of children was 27.3 million. For the period 1989 through 1992, essentially the same percentage (35.4%) of GDP was invested, but the birth rate had fallen to 21.2 per thousand, and the number of children had fallen to 22.6 million. The percentage invested increased significantly for the period 1993 through 1996, but there is no basis for attributing the increase to any significant change in the cost of children—the lagged birth rate decreased by 3% and the number of children increased by 4% compared with the previous 3 years. Whatever the reason for the large increase in the rate of investment from 1993 through 1996, it could not have been because of the change in birth rate or the number of children.

The cost of children is taken from consumption expenditures—not savings or investment—and is borne by their parents, who substitute the utility or satisfaction they derive from their children for the utility they would have derived from their own greater personal consumption of goods and services.

The absence of a relationship between the relative importance of children in the population and the rate of investment or savings as conventionally defined is not unique to China—it applies to both developing and developed countries.

In an empirical analysis of more than 100 developing countries, Kelley (1988) found that the coefficient of the rate of savings on the percentage of the population that was 15 years or

Table 1
Birth rates, number of children and investment rate, China, 1972–1996

Years	Birth rate ^a (per 1,000)	No. of children ^b (millions)	Investment rate ^c (% of GDP)
1972–75	34.3	27.3	35.6
1976–79	28.4	25.0	35.8
1980–83	22.6	21.3	33.8
1984–87	20.0	19.9	36.5
1988–91	21.0	22.0	35.5
1989–92	21.2	22.6	35.4
1993–96	20.6	23.4	41.1

^a Average birth rate for decade ending in the years indicated.

^b The number of children 10 years of age and younger was estimated by multiplying the birth rate for a decade by the population of the mid-year of the decade.

^c The investment rate is the percentage of GDP invested.

Sources: SSB (various years)

less in age influencing financial saving was not significantly different from zero.⁵ Financial saving included all saving and investment as normally defined: investment in buildings, equipment, factories, and so forth. When savings were redefined to include governmental expenditures on education, the coefficient of the percentage of the population that was 0 to 15 years of age was negative and statistically significant.

Two comments are in order. First, the coefficient in the equation with total investment (including public expenditures on education) was very small, and it would take a reduction of 10 percentage points in the population 0 to 15 years of age in the developing countries to increase the rate of savings by 1 percentage point. The percentage of the population in this age group in China in 1982 was 34%; in 1995 it was 27%. Thus if China reacted as other developing countries do, the effect of the reduction in the young population by 10 percentage points would have increased the saving rate by less than 1 percentage point or by approximately 2.5% of the average rate of investment. The actual decline in the percentage of the population 15 years and younger was a decline of less than 10 percentage points.

Second, a decline in the percentage of the population that is young is soon followed by an increase in the percentage of the population that is old. This effect should not be ignored. For the developing countries, the empirical analysis found that a change of 1% in the population greater than 65 years had 3.5 times as much negative effect on total savings or investment rates (including the government expenditure on education) as did a 1% change in the young population. Elderly people “dissave”—they spend more than they produce. In China the percentage of the population that was elderly increased from 9.3% in 1982 to 12.0% in 1995. According to the statistical analysis for all developing countries, the nearly 3-percentage-point increase in the elderly in the total population had a larger negative effect on savings, including governmental expenditures on education, than the small positive effect of the reduction in the percentage of the population 14 years and younger. Thus if the total and longer-run effects of reducing birth rates are considered, lowering the birth rate may have a small, negative effect on savings and investment. This is clearly contrary to what is assumed by those who support limiting population growth in China.

3. Empirical studies of population and economic growth

A typical empirical study of the effect of population growth on the growth rate of per capita GDP was undertaken by Levine and Renelt (1992). Their data base included from 83 to 103 countries, and they published the results of five different regressions, covering the periods 1960 through 1989 or 1960 through 1985, that included a variety of independent variables in addition to the rate of population growth. Examples of the other variables included are initial GDP per capita, investment share in GDP, school enrollment, share of government, and export growth.

⁵ Barro (1997) found in a regression analysis of factors affecting the investment ratio that included more than 80 countries, that the fertility rate did not affect the investment ratio. His data were for 1965 through 1974, 1975 through 1984, and 1985 through 1990. The coefficient was negative but not statistically significant. His results confirmed those obtained by Kelley (1996).

In four of the five regressions, the coefficient of population growth was statistically insignificant different from zero (one was positive); in only one regression was it both negative and statistically significant. In that regression it had a value of -0.53 , indicating that a one-percentage-point decline in the rate of population growth would increase the rate of growth of GDP per capita by 0.53 percentage points. From 1950 through 1972, the annual rate of growth of China's population was 2.1%; from 1990 through 1996, it was 1.14%. Thus the decline in the rate of population growth was approximately one percentage point, only part of which was the result of the population policy. However for the moment, assume that all of it was the result of the policy, then the maximum effect would have been to increase the growth rate of per capita income by approximately 0.5%. From 1990 through 1996, the annual rate of growth of per capita gross national product was 10% (State Statistical Bureau, 1997). Thus if we accept the one regression that had a significant coefficient and ignore the other four, the maximum effect of the reduction in population growth rate would have been to increase the growth of GDP per capita from 9.5% to 10.0% annually.

But this is not all of the story. The economy of China from 1990 through 1996 benefited significantly from the higher rates of population growth during the 1960s and early 1970s. In 1982, 57.1% of the population was of working age; in the 1990s, 62% was of working age. The percentage of the population employed also increased significantly: from 44% to 56%. Consequently, some part of the high growth rate of GNP in the 1990s was the result of the increase in percentage of the population employed that was the result, in considerable part, of the high rate of population growth two and three decades earlier combined with the subsequent decline in that growth rate. This is a temporary effect and will soon be offset by one of the undesirable effects of fertility decline, the aging of the population.

There have been numerous statistical analyses of factors affecting the growth of per capita income that have included population growth or fertility as one of the relevant variables. A rough summary of their results is that for studies that emphasized data for the 1960s and 1970s, nearly all studies found no statistically significant relationship between population and economic growth. However, a study of the 1980s (Kelley & Schmidt, 1996) found that there was a negative association for the developing countries. Do these results suggest that the earlier results of no association should now be disregarded? The authors of the new study did not conclude that the results obtained for the 1980s would apply to the 1990s and beyond: "... we do *not* conclude that a new result has emerged for the 1990s and beyond; we only conclude that for the 1980s, the result is different from that of previous decades" (Kelley, 1996, p. 30). One reason the results for 1980s may differ from those of the previous decades is that the rate of per capita economic growth in the developing countries was very low during the decade (China was not in the sample). For the median developing country, the annual rate of growth of per capita GDP was only 0.36%, and under these circumstances it is quite possible that population growth would have a small negative effect on economic growth.

A subsequent study that included the density of population (persons per km²) in the early years of this century and in 1960 as a variable found that for 1960 through 1990, with growth of per capita GDP as the dependent variable, the coefficient of the growth of population was negative but was not significant in any of the regressions (Burkett, 1999). When the regressions were run for 1960 through 1975, four of the six regressions had coefficients of the population growth variable that were positive and statistically significant. For the period 1975

through 1990, none of the coefficients of the population growth variable were statistically significant. An important difference between this and the Kelley analysis was the inclusion of population density as a variable. In every regression, the population density variable was positive and statistically significant. In other words, the greater the population density in either the early years of this century or in 1960, the more rapid the rate of growth of per capita GDP in recent decades, including the period 1975 through 1990. It is worth noting that it has been the most densely populated areas of China that have both the highest per capita incomes and the most rapid rates of growth of income since 1978.

Whatever the contemporaneous effect of population growth on per capita GDP growth, it appears to be very small and, when statistically significant, seems as likely to be positive as it is to be negative.

4. Why more people may make things better

The conclusion that an increase in population may have few or no negative effects on well-being and may, in fact, have positive effects is of recent origin, going back no more than three decades. At the time China announced the first of its systematic efforts to induce reductions in fertility in 1971, the accepted view among scholars was that a smaller population was better than a larger one. But in the past three decades there has been more attention given to understanding what has actually occurred in the world, both historically and contemporaneously. To a considerable degree, this has been made possible by the increased availability of data.

The view that slow or no population growth is superior to a significant rate of population growth, such as 1.0% or 2.0% annually, contradicts what we see in world history and the world around us. Throughout most of human experience, certainly more than 99% of it, there was slow population growth and little or no improvement in well-being. Life expectancy, for example, in the 17th century in Europe was very similar to that 10 millennia earlier; most of the world's population remained subject to occasional famine. There were famines in Western Europe in the 19th century.

The industrial countries that emerged in the 18th and 19th centuries were the first to have population growth rates that exceeded 0.5% annually, and from 1750 to the early 20th century, population growth rates in the industrial countries exceeded those in the developing world. It was during that period that the quality of life began to change significantly in the industrial countries: more food, increased life expectancy, and higher per capita incomes.

It was not until 1920 that population growth in the developing countries exceeded that of the industrial countries, and it was not until after the 1940s that the people of developing countries began to see an improvement in their conditions of life: more food, decreased mortality, and rapidly growing incomes. For the last half of this century, the developing countries had the most rapid rates of population growth in the history of the world as well as the highest rates of real per capita income growth that have ever occurred.

China's historical experience is consistent with what has been described. From 1820 through 1950, China's population grew at an annual rate of 0.28%, whereas its per capita GDP grew at only 0.12% (Maddison, 1995). According to the same source, from 1950

through 1978 the population growth rate was 2.10%, and per capita GDP grew at 2.86%. With the reforms that started in 1978, the rate of growth of GDP per capita increased to 6.1%, whereas population grew at 1.43%. China's period of rapid economic growth occurred while the rate of population growth was several fold greater than it had been historically.

The earlier experience of the industrial countries and the recent experience of the developing countries does not prove that rapid population growth was the source of the rapid economic growth. What the record does show, however, is that rapid population growth did not destroy everything, that is, that rapid improvement in the conditions of life and rapid population growth occurred simultaneously. It is certainly true that the large improvement in living conditions that occurred had a significant effect in increasing population. The rapid growth of population after 1950 was the result of a major decline in mortality and not of rising fertility in the developing countries. The decline in mortality was the result of improved sanitation, increased access to clean water, increased food consumption, and greater availability of medical services, all made possible by the growth of real incomes.

Even if the causal relationship ran solely from higher incomes to population growth, the question still remains regarding how the developing countries were able to accommodate the rapid population growth while realizing substantial improvement in the conditions of life. But the following question must arise. Is it not possible that there was a two-way relationship: not only did higher incomes contribute to population growth but population growth contributed to income growth? The relationships between population and economic growth are clearly not simple ones, and serious policy errors may result if this is assumed.

What are the positive effects? One is that for a given level of income, the more people there are, the more discoveries there will be, thus making the rate of technological improvement a function of population size. In addition, the larger the population, the more people will take advantage of the improvement. Kremer (1993), in a highly original analysis, found that the growth of world population from the beginning of man's existence to the present was consistent with the conclusion that for the world, technological change has been a function of population size.

Another positive effect may be that there are increasing returns to scale. The returns to scale are of two sorts. One is to the size of the community or city. The development of cities is one indication that there are advantages to be obtained from agglomeration—of bringing related activities together—and making possible specialization of activities. When economies are largely rural, the specialization of activities is limited, and although learning by doing occurs in agriculture, its importance increases with the development of cities and with industrial development. Large cities developed only as agricultural productivity improved and the population grew. The second form of returns to scale relates to the size of enterprises. As Adam Smith (Smith, 1937) taught us, the division of labor or specialization is a function of the size of the market, and population size is one of the important factors determining the size of the market and the size of enterprises engaged in productive activities.

5. Population is only one variable affecting well-being

Even if one accepted the traditional view that population growth has some adverse effect on well-being, it must be noted that population is only one variable of many that affects the

rate of economic development. The evidence indicates that, at most, it could be a relatively unimportant one. China's recent experience supports this conclusion. There is a sharp break in the rate of growth of GDP per capita at 1978; before 1978 GDP per capita grew at 3.3%, whereas afterward it grew at 8.4%.⁶ The rate of growth of population declined after 1978—from 1.91% from 1957 through 1978 to 1.34% from 1978 through 1996. The difference in the annual rate of growth of per capita GDP was 5.1 percentage points compared to a change in the population growth rate of 0.57%. Even if the productivity of the added population resulting from the higher rate of growth before 1978 had been zero, the difference in the rate of growth of per capita GDP would still have been 4.5 percentage points, largely because of the positive effects of the reforms.

Much is made of China's large share of the world population and small share of the world's cultivated land. Yet after 1978 the rate of growth of agricultural output was double what it was from 1955 through 1978. The increase resulted from increased output per unit of land; according to the available data, there was not an increase in the amount of cultivated land after 1978.⁷ Grain yields increased 75% from 1978 through 1996. The rapid growth of agricultural output after 1978 was largely the result of the incentives provided by the reforms, the government's investment in agricultural research, and the increased use of purchased inputs. Although research and new knowledge cannot repeal the law of diminishing returns, it can largely eliminate its restrictive effects. By finding substitutes for land—better management, more timely operations, improved seeds and fertilizers—China now provides a much better diet for nearly twice as many people as there were in the mid-1950s and, as noted, on the same amount of land.

China is now entering the stage of development in which it is finding substitutes for labor as well as for land; farm employment has peaked and is declining year by year. This is a process that has gone on in all developed countries. In the United States, for example, from 1940 through 1980, farm employment declined by 79%, whereas farm output increased by 115%. Output per worker increased nine times. These changes are mentioned to indicate that agricultural researchers, producers of agricultural inputs, and farmers have found ways to offset the effects of diminishing returns. Had they not done so, millions of farm workers could not have been released for employment in the industrial and service sectors.

The world does not now have more land suitable for agriculture than it had 100 years ago; it presumably has somewhat less oil, coal, and iron. How has it been possible to provide nearly four times as many people with a much higher level of consumption than at the beginning of this century? A primary factor has been knowledge and our ability and willingness to apply that knowledge to improve the conditions of life. Not all countries acquired the capac-

⁶ The growth of GDP for 1957 through 1978 was based on the growth of national income, because GDP estimates are not given for years before 1978 in the *China Statistical Yearbook*. For 1978 through 1989, the rates of growth of the two measures of income were almost identical: with 1978 = 100, the indexes for 1989 were 436 and 440.

⁷ There seems to be a lack of confidence among some Chinese officials in what Chinese farmers can accomplish. In the *Family Planning White Paper*, issued in August 1995, the following is stated: "In 1993, despite a bumper harvest witnessed in China's production, the per capita share of grain was only 387.3 kg. Forecasts show that China's per capita output of grain will remain at the low level of less than 400 kg of crude grain for a long time, due to the continued growth of the population size in the future." Few forecasts have been contradicted by experience so quickly—in 1996 China's per capita grain production reached 413 kg!

ity to apply the available knowledge at the same time. The now-developed countries started some two centuries ago to use the knowledge that supported development for the benefit of their citizens, although most of the real benefits did not start until near the end of the 19th century.⁸ Developing countries, including China, did not make significant gains in the welfare of their people until the middle of this century.

6. Factors affecting fertility

We know of no published study that has analyzed how much effect China's population policy has had on fertility and how much other factors, such as changes in the economy (increased incomes, greater urbanization), reductions in mortality, increased education for women, and greater employment opportunities for women outside the home, have had. It is not true, as implied by some official statements, that all of the reduction in fertility has been the result of the policy. Other countries that have had fertility declines similar to China's have done so without most of the elements of China's policy (see Table 2).

It was hoped that a statistical analysis of the various factors that have been associated with the decline in fertility in China over the past three decades could be presented. Unfortunately, access to insufficient data made this impossible. It is not that such data do not exist, but simply that there were inaccessible. As a result, only an analysis that is considerably impressionistic and based on much less than full information can be presented. Nevertheless, something can be learned from comparative analysis and by reviewing the available analyses of factors that have affected fertility in developing countries generally.

However, not every statement by a knowledgeable official implies that the entire reduction in fertility is the result of the population policy. In 1993, Peng Peiyun, then Minister-in-Charge of the State Family Planning Commission, noted: "It should be pointed out that China's socioeconomic development has also produced a positive impact on family planning. In recent years the economy has developed very rapidly. . . . The people have been devoting more efforts to economic activities. In order to become rich more quickly and build a society that is comfortably off, many couples would like to have fewer children and delayed childbearing. They prefer gold babies to "chubby babies" (that is, they prefer to get rich be-

⁸ In *China's Economy in 2000*, the position taken is that the new knowledge—technological advance—can and will offset diminishing supplies of natural resources. After indicating their difference with the pessimistic views expressed in the Club of Rome's *The Limits to Growth*, the authors stated: "The reason we control population growth by maintaining it on a fairly low and stabilized level is not due to a pessimistic view of future production and the future in general. Following industrial development, certain natural resources may be reduced or even exhausted. But technological advancement will reveal new resources and enable other resources to better serve the need of mankind. . . . The strategy of controlling population growth does not stem from a pessimistic estimation of the exhaustibility of material resources; it is a strategy developed for the purpose of raising the level of consumption, increasing social accumulation power and investment, while at the same time developing material production in order to prepare for the continuous improvement of the material and cultural well-being of the whole people" (Liu et al., 1987, p. 297).

As noted in footnote 2, the authors argue that the cost of children comes out of investment and saving. However, they provide no evidence to support that conclusion. If knowledge can substitute for natural resources, and if the cost of children comes out of consumption funds, the rationale for limiting or planning population growth is seriously weakened.

Table 2
Total fertility rates for China and selected countries, 1950–1990 and 1995

Country	1950–55	1955–60	1960–65	1965–70	1970–75	1975–80	1980–85	1985–90	1995
China	6.24	5.4	5.93	5.99	4.76	2.9	2.52	2.38	1.9
South Korea	5.18	6.07	5.4	4.52	4.11	2.8	2.4	1.73	1.8
Thailand	6.62	6.42	6.42	6.14	5.01	4.27	2.96	2.57	1.8
Sri Lanka	5.74	5.44	5.16	4.68	4	3.83	3.25	2.67	2.3
Chile	5.1	5.3	5.28	4.44	3.63	2.9	2.8	2.73	2.3
Guyana	6.68	6.76	6.15	6.11	4.9	3.94	3.26	2.77	2.6 ^a
Hong Kong	4.43	4.7	5.3	4.01	2.89	2.31	1.8	1.36	1.2
Singapore	6.41	6	4.93	3.46	2.63	1.87	1.69	1.69	1.7
Taiwan	6.7	6	5.1	4.2	3.4	2.7	2.17	1.74	1.75
China ^b									
Urban	5.34	5.07	4.36	3.37	2.49	1.51	1.33	na	na
Rural	6.25	5.49	6.43	6.51	5.24	4.97	2.83	na	na

na = not available.

^a 1990–95

^b There are small differences in the estimated total fertility rates in the UN and State Statistical Bureau sources.

SOURCES: United Nations 1993: Table 41; State Statistical Bureau, Department of Population 1989, 1991

fore having children). Another cause is that some women of childbearing age have already borne children ahead of plan or had unplanned births, while some others are practicing deferred marriage and delayed child bearing, therefore pushing off the delivery of births and resulting in a decline in the birth rate of China's population in recent years" (Peng, 1993, p. 401). As a result of socioeconomic development, the number of children desired by many women has been reduced, and as a result, the birth rate has declined. As has been true in many other developing countries, increased incomes have resulted in a reduction both in the number of children desired and in the number of children born.

The effectiveness of the population policy in reducing fertility in urban areas is called into question by the pattern of decline in urban birth rates before the early 1970s. Urban births have not declined significantly over the past four decades, rather, much of the reduction occurred before there was a formal population policy that went beyond providing family planning services. The urban birth rate averaged 40 per 1,000 people from 1954 through 1958 (State Statistical Bureau, 1984, p. 83). Birth rates declined to 27 per 1,000 in 1965 and to 21 per 1,000 in 1966. No data are given for urban birth rates in the *Statistical Yearbooks of China* for 1967 through 1970, presumably because of the disruption of the statistical services during the early years of the Cultural Revolution. The 1971 urban birth rate was estimated to be 21 per 1,000—the same as in 1966.⁹ Urban birth rates did decline during the 1970s under

⁹ In the *Family Planning White Paper*, issued on 23 August 1995, it was stated in the English edition: "In 1973, China began to promote family planning throughout the country." The 1973 date seems to be a misprint. The policy of promoting family planning was introduced in 1971 but should have had little or no effect on birth rates in that year.

The decline in urban birth rates in the 1960s cannot be attributed to the disruption of normal life caused by the Cultural Revolution, because the decline occurred before mid-1966, when the Cultural Revolution began. The urban birth rate in the early 1970s was the same as in the mid-1960s.

the policy of later marriage, delayed child bearing, and fewer children. However, the absolute reduction during the 1970s was much less than that from the 1950s through the mid-1960s, and the percentage reduction from 1971 through 1996 of 30% is significantly smaller than the 38% reduction from 1958 through 1965. These data clearly support the conclusion that urban families were responding to the changes in the conditions affecting their lives and had substantially reduced the number of children desired and the actual number of children born before the implementation of the population policy that went beyond the provision of family planning services.

The decline in urban birth rates before 1971 can be attributed primarily to two factors that were common to the other socialist countries where fertility also declined very rapidly, although without any effort made to achieve fertility reduction and with little or no emphasis on family planning.¹⁰ First, a high percentage of adult urban females, especially those in their child-bearing years, became members of the formal labor force. Second, housing space was very limited, a universal phenomenon in the socialist countries. There has been substantial improvement in urban housing since 1978, but in 1978 the per capita living space in urban areas was 3.6 m² (State Statistical Bureau, 1995, p. 290). The amount of living space was a factor affecting the number of children desired and the number actually born.¹¹

An empirical study of fertility in developing countries by Subbarao and Raney (1995) found that the most important variable affecting fertility was the percentage of girls who attended secondary schools. With a lag of approximately one decade, an increase in the percentage of females in secondary schools from 19% in 1965 to 38% in 1989 would have reduced fertility by 1.4 births per woman, or 26%, from the average fertility rate of 5.3 births per woman in the developing countries when 19% of the girls were attending secondary or middle school. If the effect in China were the same as in developing countries generally, the effect of the increase in the percentage of girls in secondary school from 19% in 1965 to 38% in 1989 would account for approximately half of the actual reduction in the national fertility that occurred from 1970 through 1975 of 4.76 births per woman to 1.9 births in 1995.

An increase in the percentage of young women who go to secondary schools reduces fertility by delaying marriage and increasing the value of a young woman's time, thus increasing the cost of having children. Children require time, and the time cost seems to be more important than the monetary cost in affecting the desired number of children. A third and somewhat less important reason is that as the amount of education increases, women are more successful in having the number of children they desire by avoiding unwanted pregnancies.

¹⁰ For example, in the Soviet Union, the only contraceptive technique that was generally available was abortion. But by 1970 the birth rate in the Soviet Union, including the rural areas, had declined to a little over 17 per thousand and stayed in the range of 17 to 20 over the next two decades.

¹¹ In an empirical analysis of 180 urban areas, Gary Jefferson (1990) found that the amount of housing space had a significant positive effect on fertility. His study was based on birth rates in 1987. In addition to revealing the effect of housing space on fertility, he found that when other relevant variables were held constant (such as age, education, and nature of employment) there was no difference between the birth rates of those engaged in agriculture and those who were not.

7. Fertility in rural areas

As noted above, urban birth rates declined rapidly during the 1960s and into the early 1970s. In recent years the birth rate in rural areas has been significantly higher than in urban areas. There are a number of reasons why this is the case (Johnson, 1994). One important reason for the higher rural birth rate is that a significantly smaller percentage of girls go to secondary schools than in urban areas. Thus one of the major factors responsible for declining fertility in developing countries has not been as important in rural as in urban areas in China.

Another reason is that the role of a son in the life of a rural family is much greater than for an urban family. Rural families must depend on having a son to provide for old age security as well as for support if there are serious disabilities. In urban areas most families have pensions; pensions are available for a tiny minority of rural families.¹² Because the probability of having a son is approximately 50% for each birth, with two children the probability that both will be girls is approximately 25%. The population policy was modified for rural areas; the one child policy was replaced by a policy that permitted a second child if the first child were a girl, thus recognizing the important role of a son in the life of rural families. However as noted, permitting two children would still leave approximately one fourth of rural families without a son, and the evidence is very clear that third and higher parities occur primarily where the previous children are only girls.

If farm families owned the land they farmed, such ownership would provide a significant degree of financial security for the elderly. But with collective ownership of land this alternative is not available to farmers.

One factor that may have contributed to higher fertility in rural than in urban areas is that in most villages, land has been reallocated on the basis of demographic changes. This has meant that when someone died, the amount of land was reduced. It also meant that when a child was added to the family, the family received more land. This clearly provided an incentive to have more children. The implications of this policy to the population policy was recognized by the recent announcement that in the future, land use rights would be guaranteed for 30 years and there were to be no reallocations of land for demographic changes. However, because this is a policy statement and not a law, villages are not required to follow it, and reallocations are likely to continue.

8. What if?

What would happen to fertility and population growth if the present population policy were changed to one that emphasized family planning and permitted families to have the number of children that they wished? On the basis of the information that now is generally

¹² Starting in 1993 a voluntary pension system became available to rural people. Participants make payments into the fund and the money is invested in fixed interest bearing accounts. At the end of 1997 only 82 million had paid some money into the accounts. The average amount of the payment was very small—231 yuan (about \$30). The pension system needs substantial revision before it would provide reasonable financial security for the elderly. Through 1997 the real rate of return on the invested funds was negative—the rate of inflation exceeded the rate of interest earned.

available, it is impossible to give a very precise answer to that question. It appears to be a question that the social science community should attempt to answer with systematic studies of the factors affecting fertility in China.

Based on what we do know, it seems reasonable to project that there would be an increase in fertility, but that it would be very small in urban areas. It would also be relatively small in the higher income rural areas with their reduced reliance on income from agriculture and their more fully developed secondary school systems. There would be increased fertility in the lower income rural areas. How large would the overall increase in population be? It is, of course, not possible to say, but it seems unlikely that after two decades or so it could be more than 10%.

Two aspects of the possible change in population policy merit systematic study. One would be what changes in current social and economic policies could be instituted to reduce the desired number of children, especially in the lower income rural areas. The other would be to explore definitively what the effects of a further significant increase in population would be on the well-being of the Chinese people.

There is considerable evidence to support the following changes in social and economic policies affecting rural areas as elements of a program that would reduce fertility and maintain it at a relatively low level: (1) significantly improve the quality of rural secondary schools and increase the percentage of girls attending; (2) create an attractive pension program for rural areas—a program that assured farm people of a positive real rate of return on their payments into the system; (3) give farm people the ownership or permanent rights to the use of the land they farm or, failing that, enforce the policy of no reallocation of farm land on the basis of demographic changes; and (4) change policies and institutions so that families could migrate from rural to urban areas (Johnson, 1994). Families that migrate from rural to urban areas very soon adopt the fertility patterns of the urban areas, resulting in a substantial decline in fertility.¹³

The impact of an increase of 10% in the population of China would have minimal effects on the well-being of Chinese people. This is based on the conclusion that the major factors affecting the wealth and welfare of nations are knowledge, the appropriate economic and social policies, and human capital. Natural resources now have a minor role because knowledge has permitted us to find effective substitutes for them. China has clearly shown that it has the capacity to create knowledge, as evidenced by the great increase in agricultural productivity, and to create and introduce social and economic policies that have proved remarkably successful in increasing productivity since 1978. China has provided abundant evidence that economic policies have a far greater effect—either positive or negative—on economic growth and development than any other variable, including population growth, that is

¹³ While there are millions of individuals who have moved from rural to urban areas, at least temporarily, the majority are married men who have left their families in the villages. While the hukou system restricts rural to urban migration, probably the most important factor limiting migration of families is the availability of housing. The housing of urban workers has been provided by the employers, at least until recently. The employers that employ most of the migrant workers do not provide housing for family members and provide only the most minimal housing for the workers. Migrant workers do not receive wages high enough to provide housing for their families. Rural to urban migration that involves families will occur only as there is a private housing market and as urban wages are adjusted to reflect the fact that workers must pay the full cost of their housing.

thought to influence the rate of economic growth. In fact, continued adherence to the belief that the future well-being of Chinese people depends on limiting population growth represents a denial of the overwhelming contributions of China's reform policies.

Where China has fallen behind many other developing countries is in the creation of human capital—China spends a very low percentage of its national income on education. A shift of some of the very large investment in physical capital to significantly increased investment in human capital would pay large dividends.

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