11

Population

After discussing the role of population and human capital in economic development, this chapter studies the growth trends in China's population and the government's population policy. It includes a critical evaluation of China's population policy. It also presents economic explanations of the rate of growth of population, in particular the birth rate.

11.1 The Role of Population and Human Capital in Economic Development

Among economists known for their pessimistic predictions for the world, one of the best-known is the English economist and clergyman Thomas R. Malthus (1766–1834). In *An Essay on the Principle of Population* (1798), Malthus argued that if left unchecked, population would grow faster than the food supply, leading to starvation and economic stagnation. His prediction failed to materialize, however, partly because technological progress increased the supply of food and other consumer goods and partly because population growth slowed down when people's incomes increased. Although Malthus's theory turned out to be wrong, it contains partial truths for some countries that had difficulty in achieving economic development for fairly long periods. For these countries, population growth was as fast as, if not faster than, the growth in food supply. An increase in per capita national income or output in these countries would require a reduction in the rate of population growth, or an increase in the rate of output growth, or both.

Chairman Mao Zedong made a statement in 1949 that encouraged the growth of China's population in the late 1950s and the 1960s:

> A large population in China is a very good thing. With a population increase of several fold we still have an adequate solution. The solution lies in production. The fallacy of the Western capitalist economists like Malthus that the increase of food lags behind the increase of population was long ago refuted in theoretical reasoning by the Marxists; it

has also been disproved by the facts existing after the revolution of the Soviet Union and in the liberated region of China.

In 1958 Mao's statement was used as a basis for criticizing Professor Ma Yin-Chu for advocating family planning and population control. In 1975 Ma was rehabilitated, and the earlier criticism of him was recognized to be a mistake. Most economists in China believe, correctly or incorrectly, that if not for the mistaken population policy, the Chinese population would have been smaller and per capita income in China would be much higher in the 1980s. Since the early 1970s, Chinese leaders have tried to curtail the growth of population, hoping to undo the harm of the population policy in the 1960s. We will say more on this reversal in policy later in this chapter.

Why does a larger population imply a smaller output per capita? In the United States, some would argue that the increase in population from immigration during the first half of the twentieth century actually helped increase national output to the extent that per capita output became higher than otherwise. Although such a conjecture might be mistaken, it makes one think twice before jumping to the conclusion that an increase in population necessarily means a reduction in national output per capita. This conclusion is likely to be valid for countries with very limited resources in comparison to the size of their populations. Imagine many people farming on a small piece of land. The marginal product of labor declines as the number of farmers increases. The marginal product of labor is the partial derivative of output with respect to labor, holding the quantity of land and capital fixed. Using a Cobb–Douglas production function with labor, land, and capital as three factors, and under the assumption of constant returns to scale, one can easily see that the marginal product of each factor declines as the quantity of that factor increases, holding the remaining two factors constant. When the marginal product of labor declines, the increase in output by adding the fifteenth farmer is smaller than the increase in output by adding the fourteenth farmer. As we pointed out in chapter 5, the marginal product of Chinese labor is low because of the very large population. Lewis (1955) makes the strong assumption that for some less-developed countries with a large population relative to land, the marginal product of agricultural labor is practically zero. If more people mean only more mouths to feed and very little extra output, output per person will decrease as the number of people increases.

How is it possible for output per person to increase when population increases? Economic development has been observed in many countries, including China, where national income per capita increased while total population also increased. Again using a Cobb–Douglas production function with constant returns to scale, one can easily show that output per person can increase even when the number of persons engaged in production increases, provided the quantities of other inputs become larger relative to the quantity of labor. Given the ratio of the quantity of other inputs to labor, output per person can also increase when there is technological change or when the quality of labor improves. Improvement in the quality of labor occurs through education, on-the-job training, and better healthcare. These are different forms of investment in human capital. While population measures the quantity of labor without adjustment for quality, the amount of human capital measures the quantity of labor after adjustment for quality. Holding the quality of labor fixed, one finds that

an increase in the quantity of labor or population leads to a reduction in output per person unless it is matched by increases in other inputs or by the improvement of technology. Holding population fixed, one finds that investment in human capital leads to an increase in output per person in the short run. In the long run it can lead to improvement in technology. The productivity of a given population is likened to the productivity of a given piece of land: it can be increased greatly by investment. Just as fertilizer, irrigation, and crop-rotation increase the productivity of land, so do education, on-the-job training, and better healthcare increase the productivity of people. However, the question remains whether, with fewer people, increase in capital, technological change, and investment in human capital would lead to a greater increase in per capita output.

In section 11.2 we present and analyze data on China's population and its growth rates. Section 11.3 is concerned with population policy in China and its possible effect on population growth. In section 11.4 we present an evaluation of this policy. Section 11.5 discusses economic explanations of the birth rate.

11.2 Chinese Population and its Rate of Growth

In the early 1980s China received aid from the United Nations to improve its population census and population studies. As early as 1979, a team of scholars from China came to Princeton University and other centers of population studies in the United States to learn about recent developments in demography.

Official data on Chinese population were fragmentary at that time, but have since improved in quality and have been published. The *Statistical Yearbook of China, 1999*, table 4-1, gives data for 1952, 1957, 1962, 1965, 1970, 1975, 1980, and annually from 1985 to 1998 on total population, and population by sex and by residence in urban and rural areas. Total population increased from 574.8 million in 1952 to 987.0 million in 1985 and 1,248.1 million in 1998. The exponential rate of increase before 1980 was 0.0193 and since 1980 has been 0.013. The proportion of rural population was 87.54 percent in 1952, 82.08 per cent in 1978, and 69.60 percent in 1998.

The rate of population growth, usually expressed as the increase per 1,000 persons per year, is the difference between the birth rate and the death rate, provided that there is no net migration to or from the country concerned. According to table 11.1 (based on table 4-2 of the *Statistical Yearbook of China, 1999*), the death rate in China decreased steadily from the 1950s to the 1970s, reaching to 6.25 per 1,000 in 1978. This is an indication of the great improvement in healthcare in China during this period. Other contributing factors include the availability of cleaner water and the more frequent use of boiled water. In many countries, as the economy developed, the death rate declined. In Taiwan, for example, the death rate decreased from 9.9 per 1,000 in 1952 to 4.7 in 1979, while the infant death rate decreased from 37.2 per 1,000 to 9.8 during the same period (see the *Statistical Yearbook of the Republic of China, 1982*, p. 3).

A most important result of economic development is that while the death rate declines, the birth rate will eventually decline by even more, so that the natural rate of population growth ("natural" meaning not counting net migration) will decrease

Table 11.1 Annual birth rate, death rate, and natural growth rate of the Chinese population, 1952–98

	National			*City*			*Country*		
Year	*Birth rate*	*Death rate*	*Natural growth rate*	*Birth rate*	*Death rate*	*Natural growth rate*	*Birth rate*	*Death rate*	*Natural growth rate*
1952	37.00	17.00	20.00						
1957	34.03	10.80	23.23	44.48	8.47	36.01	32.81	11.07	21.74
1962	37.01	10.02	26.99	35.46	8.28	27.18	37.27	10.32	26.95
1965	37.88	9.50	23.38	26.59	5.69	20.90	39.53	10.06	29.47
1971	30.65	7.32	23.33	21.30	5.35	15.95	31.86	7.57	24.29
1975	23.01	7.32	15.69	14.71	5.39	9.32	24.17	7.59	16.58
1978	18.25	6.25	12.00	13.56	5.12	8.44	18.91	6.42	12.49
1980	18.21	6.34	11.87	14.17	5.48	8.69	18.82	6.47	12.35
1985	21.04	6.78	14.26						
1986	22.43	6.86	15.57						
1987	23.33	6.72	16.61						
1988	22.37	6.64	15.73						
1989	21.58	6.54	15.04	16.73	5.78	10.95	23.27	6.81	16.46
1990	21.06	6.67	14.39	16.14	5.71	10.43	22.80	7.01	15.79
1991	19.68	6.70	12.98	15.49	5.50	9.99	21.17	7.13	14.04
1992	18.24	6.64	11.60	15.47	5.77	9.70	19.09	6.91	12.18
1993	18.09	6.64	11.45	15.37	5.99	9.38	19.06	6.89	12.17
1994	17.70	6.49	11.21	15.13	5.53	9.60	18.84	6.80	12.04
1995	17.12	6.57	10.55	14.76	5.53	9.23	18.08	6.99	11.09
1996	16.98	6.56	10.42	14.47	5.65	8.82	18.02	6.94	11.08
1997	16.57	6.51	10.06	14.52	5.58	8.94	17.43	6.90	10.53
1998	16.03	6.50	9.53	13.67	5.31	8.36	17.05	7.01	10.04

significantly. This has happened in country after country in western Europe, as well as in the United States and Japan. In Taiwan, the birth rate decreased from 46.6 per 1,000 in 1952 to 24.4 in 1979, resulting in a natural rate of increase of 46.6 – 9.9, or 36.7, in 1952, as compared with a natural rate of increase of 24.4 – 4.7, or 19.7, in 1979 (see the *Statistical Yearbook of the Republic of China, 1982*, p. 3). In recent years economists have devoted much attention to explaining why the birth rate declines during economic development.

It may be pointed out that in some countries government policy concerning family planning has contributed to the decline in the birth rate. However, in most Western countries where the decline occurred, there was no government intervention in family planning. What made the potential parents voluntarily limit the number of children in the family is an interesting economic question that will be discussed in section 11.5.

For China, column 2 of table 11.1. shows that the birth rate declined from 37.00 per 1,000 in 1952 to 34.03 in 1957, 30.65 in 1971, 23.01 in 1975, and then to 18.21

in 1980; rose to 23.33 in 1987; and declined steadily to 16.03 in 1998.

What explains the moderate decline in the Chinese birth rate from 1952 to 1957? These were years of fairly rapid industrialization and very little government intervention in family planning. According to the survey article (1982) on family planning by the Policy Research Section of the Family Planning Office of the State Council published in the *Almanac of China's Economy, 1981* (p. 761), although the Chinese government advocated family planning as early as the 1950s, not much in the way of a concrete program and economic policy was implemented until the 1970s: "Although we advocated family planning work, we did not devise specific measures to implement it" (p. 762). Therefore, it is difficult to attribute the decline in birth rate between 1952 and 1957 to the government policy on family planning. More noticeable is the rapid decline in city birth rate from 44.48 per 1,000 in 1957 to 21.3 in 1971 (shown in column 5), which cannot be attributed to government birth control policy.

The *Statistical Yearbook of China, 1990*, p. 90, reports the birth rates from 1958 to 1961 as 29.22, 24.78, 20.86, and 18.02, and the death rates to be 11.98. 14.59, 25.43, and 14.24. The abnormally low birth rates and the abnormally high death rates during these four years, as compared with the more normal rates in 1957 and 1962, are the consequences of the great economic disaster of the Great Leap Forward, which began in 1958, and of the economic recovery after 1961. Note that the birth rate declined year after year from 1958 to 1961, while the death rate increased to an extremely high level of 25.43 per 1,000 in 1960. (See question 1 below.)

The same source as in the last paragraph also reports the birth rates in 1963 and 1964 to be 43.37 and 39.14, higher than in the neighboring years 1962 and 1965. These high rates might be attributed to the economic recovery from the Great Leap and to efforts to make up for the children lost during the famine years. Rapid increase in real GDP was accompanied by more agricultural market institutions, including rural markets and private plots assigned to the farm households still under the commune system. Why did the birth rate continue to decline after 1987? To what extent is this the result of government policy? Although the government advocated family planning from the early 1970s on, strong measures were not taken until the late 1970s. Yet there was already a continued drop in the birth rate from 37.88 in 1965 to 18.25 in 1978. This shows that economic forces rather than government population policy can cause a significant drop in the birth rate. In the urban areas the large increase in the participation of women in the labor force might have contributed to this decline. The increase in birth rate between 1980 and 1987, in spite of the one-child-family policy (to be discussed in the next section), is another piece of evidence suggesting that economic forces in these years of prosperity were more important in shaping the growth of population than government restriction.

A general summary of the data in table 11.1 is that as China reduced its death rate from 17 per thousand in 1952 to only 6.5 per thousand in 1998, close to the standard of developed economies (5.7 for Taiwan in 1997 and 5.8 for the United States in 1999), the birth rate has been reduced even more from 37 per thousand to 16.03 per thousand in 1998. As a result, the rate of natural increase was reduced from 20.00 per thousand in 1952 to only 9.53 in 1998. This natural growth rate is very close to the rate 9.5 for Taiwan in 1997 and not much higher than the rate 8.5 for the United States in 1999. It is a fairly small growth rate if China is considered a developing country.

11.3 Population Policy

Family planning was introduced by the Chinese government in 1971. Policy consisted of encouraging later marriage, longer intervals between births, and a smaller number of children per family. According to a survey article on family planning published by the Family Planning Office in the *Almanac of China's Economy, 1981* (pp. 762–3), the guidelines and policies of the Communist Party and the Chinese government related to family planning have become more explicit since 1978. In 1980 the government called for stricter controls on population growth with the slogan "one couple, one child." Practical measures were devised to reward couples who agreed to have only one child. This article states (pp. 763–4):

> On September 25, 1980, the Central Committee of the CPC [Chinese Communist Party] issued an open letter calling on Communist Party and Youth League members to take the lead in limiting population growth to one child per couple. This letter spelled out the general target and the policies of population control in China. Each province, municipality, autonomous region, prefecture, county and commune appointed one leading comrade – sometimes even the top leader – to take responsibility for family planning work. The work was to be put often on the agenda for discussion and review, so that problems in connection with the implementation of family planning could be solved promptly . . .
>
> The effective control of the birth rate in 1980 was ensured by the following measures:
>
> 1) We launched a popular educational campaign via mass media to provide information about family planning and to encourage couples of childbearing age to volunteer to practice birth control . . .
>
> 2) We practiced family planning by implementing economic measures. In 1980, economic rewards and penalties were introduced. Rewards were given to those units and individuals who had done good work on family planning. Those couples who volunteered to have only one child received regular child care allowances. Economic penalties were levied on the few who, after patient ideological education, still paid no attention to family planning and the very few individuals who undermined this work were punished . . .
>
> 3) We used models in family planning. Cadres at all levels and the broad masses of party and Youth League members conscientiously took the lead in having only one child. Parents who had passed childbearing age persuaded their married children to have only one child . . .
>
> 4) We stressed knowledge about eugenics . . .
>
> 5) We paid attention to the study of new trends and to the solution of new problems . . .
>
> 6) We have intensified our cooperation with other countries in family planning work . . .
>
> In summary, family planning work achieved good results in 1980, mainly through renewed ideological education supplemented by appropriate and necessary economic measures. However, there are still problems to be tackled, such as: the uneven development of the work; relatively more multiple births in remote and mountainous regions; the shortage of technical personnel; bad management and primitive, coercive working methods; the shortage of contraceptives and their poor quality; and inadequate implementation of the "one couple, one child" policy . . .
>
> The Constitution adopted at the Fifth National People's Congress in 1978 stipulates

in Article 53: The State advocates and encourages family planning. Article 12 of the marriage law adopted at the Third Session of the Fifth National People's Congress in 1980 stipulates: Husband and wife are duty bound to practice family planning. It is the legal obligation of every Chinese citizen to abide by the law and practice family planning, including the practice of late marriage and birth control.

How much effect the policy spelled out here has had on population growth in China is difficult to ascertain. There are reports that the Chinese people were strongly affected by the strict measures of population control. For example, *People's Daily*, April 7, 1983, carried an article with the headline, "Anhui Provincial Women's Association Survey Reports: Drowning of Female Infants in Rural Areas Serious, Affecting the Balance of Sex Ratio Among Infants." The article reports that, according to a survey of Suixi and Huaiyuan counties conducted by the Anhui Provincial Women's Association, in some areas the number of reported male births far exceeded the number of female births, by a ratio of as much as 5 to 1 in some cases. The article attributes this situation to the traditional preference for male children, which led to the infanticide by drowning of many female infants. In one production brigade in Huaiyuan County, more than 40 female infants were drowned in 1980 and 1981. In the Meizhuang brigade of Lunwang Commune, 8 children were born in the first quarter of 1982; while 3 males survived, 3 of the 5 females were drowned, and the other 2 females were abandoned. In view of the above, the Anhui Provincial Women's Association proposed to strengthen socialist education, making the people realize that the drowning of infants is a crime. At the same time, the association declared that people should be taught that males and females are equal and the traditional prejudices against females should be criticized. (The numbers of male and female births in the two counties and selected communes are recorded in tables 11.2a and 11.2b.) This news report is just one example, albeit a very dramatic one, of the reactions of the Chinese rural people to the family planning measures of the government.

There appears to be sufficient evidence to indicate that as a result of the one-child-family policy and the strong preference for males, the ratio of male to female population was increased. In the *China Population Statistics Yearbook 2000*, published by the China Statistics Press, one can find data on the sex ratio (female = 100) as of 1999 by age group (see table 1-2 therein). The ratio was 119.54 for ages 0–4, 114.45 for ages 5–9, 107.99 for ages 10–14, 109.94 for ages 15–19, 98.08 for ages 20–4, and 98.76 for ages 25–9. The population of ages 19 or below in 1999 was born in 1980, the year when the one-child-family policy was introduced. The older population was not affected by the policy and hence had a more normal ratio of about 98. Note that

Table 11.2a Comparison of male and female births in Suixi and Huaiyuan counties

County	*Year*	*Total*	*Male*	*% Male*	*Female*	*% Female*	*Difference*
Suixi	1979	11522	5950	51.6	5572	48.4	3.2
	1980	11554	6115	52.9	5439	47.1	5.8
Huaiyuan	1980	13487	7593	56.3	5894	43.7	12.6
	1981	10768	6266	58.2	4502	41.8	16.4

Table 11.2b Comparison of male and female births in selected communes in Huaiyuan County,1981

Location	*Total*	*Male*	*% Male*	*Female*	*% Female*	*Difference*
Commune S	133	83	62.4	50	24.8	24.8
Commune L1	104	66	63.5	38	36.5	27.0
Commune L2	231	145	62.8	86	37.6	25.6
Cummune H	285	164	57.5	121	42.5	15.0
Brigade Z	9	7	77.8	2	22.2	55.6
Brigade N	8	7	87.5	1	12.5	75.0
Brigade Q	10	9	90.0	1	10.0	80.0

Source: People's Daily, *April 7, 1983.*

the ratio was 108.01 for the 19-year-olds, 104.00 for the 20-year-olds, and 97.71 or below for the 21-, 22-, 23-, and 24-year-olds. I thank D. Gale Johnson of the University of Chicago for calling my attention to these data.

To what extent the one-child-family policy has affected the total birth rate (excluding infanticide) is difficult to ascertain. The *Statistical Yearbook of China, 1990* (p. 90) shows that in spite of the stricter measures introduced in 1980, the birth rates in 1981 and 1982 were higher than they had been in 1978 and 1979. One possible explanation for the increase in the birth rate is the agricultural reforms, which permitted farm families to operate as private farm households, thus increasing the value of children in terms of their marginal product accrued to the family. It is possible that economic forces are at work that may have stronger effects on the birth rate than the political and economic measures of the government family planning program. The net effect of these dramatic stories about abnormally low rates of female births in particular locations has not been noticeable in the statistics on total population by sex. Table 4-1 of the *Statistical Yearbook of China, 1999*, reports the proportion of males in the total population to be 51.90 in 1952, 51.45 in 1980, 51.52 in 1990, and 50.98 in 1998.

Another aspect of the government program is to encourage people to marry at later ages. Since 1971 the government had advocated a marriage age of 28 or above for males and 25 or above for females. In 1981 a new marriage law went into effect raising the legal minimum marriage age, but there was reportedly a reduction in local pressure on people to marry even later than the legal minimum age, partly to compensate for the continued strong pressure toward the one-child family. Ansley Coale, in a letter (made available to the author for publication) dated January 1983 to Song Jian, Vice-president of the Chinese Demographic Association, comments on the effects on the birth rate of the new policy regarding marriage.

> I suspect that the effect of changing mean age of childbearing is not fully appreciated in China, and that there may have been some errors in policy that come from this lack of full understanding. The point is as follows: Suppose over a long period of time that each cohort of women (those born in the same year) bears an average of 3/10 of a child annually as each cohort passes from age 23 to age 28. The women in these cohorts

would bear, on average, a total of 1.5 children, more or less in line with the childbearing targets of Chinese policy. Now suppose that in a given year (say 1981), because of a sudden decline in age at marriage, the women reaching age 22 in this year begin childbearing at that age, and then continue for five years (to age 27) at the rate of 3/10 of a child annually. Each cohort of women continues to bear an average total of 1.5 children. But in the calendar year of 1981, childbearing begins at age 22 (the younger women start earlier) and extends to age 27 (the older women are still following the old regime). Thus the total fertility rate for 1981 is not 1.5 but 20 percent higher, at 1.8. This increase in total fertility rate during each calendar year lasts for five years, until the cohorts following the old regime have finished their childbearing. Moreover, the extra births occurring during this time would not be offset by any subsequent reduction, unless there were a subsequent increase in the mean age of childbearing. The extra births would be a permanent addition to the population of China, and would in turn contribute to more births in the future.

Thus, a relaxation in the efforts to maintain a high age at marriage leads to a temporary increase in the birth rate, even if the efforts to restrict the number of children born per family to a level of 1.5 remain fully successful. I have heard, although I am not sure that my information is correct, that Chinese authorities have felt that the efforts to restrict childbearing to one or at most two children, is so successful that there was no need any longer to maintain the pressure towards late marriage. For the reasons outlined above, a relaxation in pressure to keep marriage late in fact produces a temporary increase in the birth rate of possibly substantial magnitude.

According to an article in *People's Daily*, March 14, 1982, the new marriage law had the effect of increasing the number of marriages in 1981 as compared with 1980. This increase, however, probably could partly explain the time pattern of the birth rates 18.21, 20.91, 21.09, 18.62, and 17.50 respectively in the five years from 1980 to 1984 as reported in the *Statistical Yearbook of China, 1990*, p. 90.

In 1983, the one-child policy was liberalized somewhat by allowing two children in rural areas if the first child was a girl. Penalties for having the second child in urban families amount to 10 to 20 percent of the combined wages of both parents for 3 to 14 years and also to a loss of job in many cases. Sometimes a large lump-sum fine is imposed which goes as high as 40 percent of the annual earnings of one adult. In the late 1990s the enforcement of the one-child policy has become less strict in many areas.

11.4 Evaluation of China's Population Policy

Let us consider the pros and cons of China's one-child-family policy by first citing the reasons given to justify this policy. First, it is said that China is overpopulated. Second, as an elaboration of the first point, China is too poor to feed its large population. Third, as a special case of the second, having a lower population growth rate will help increase economic growth per capita. Let us consider these arguments in turn.

It is true that China is the most populous country in the world, with almost 1.3 billion persons at the turn of the twentieth century. However it is geographically a large country, being the third largest in the world ranking below only Russia and Canada. One needs to have some criterion to judge how many people are too many.

In terms of population density, or the number of persons per unit of land, China is less densely populated than almost all countries in western Europe, Japan, and Taiwan. It has more cultivated cropland per capita than Taiwan, 0.27 acres compared with 0.12 acres as of 1980, although the average quality of the land in Taiwan, allowing for rainfall, is probably better. In addition, a high population density or a small amount of land per person does not set a severe limitation even on agricultural output, which depends on the choice of crop, fertilizer, and technology. If China were not treated as one country but its individual provinces considered separately, the population densities of most provinces would not be large compared with European countries. Also, in the most densely populated provinces the per capita incomes are highest. Therefore it does not make sense to say that China is overpopulated in the sense of population density.

Second, one may judge the size of the population in terms of China's output. China is self-sufficient in food supply; it exports more food than it imports. It would be economically advantageous to import some agricultural products in exchange for some Chinese exports. By 1999 China's per capita income was not very low. It was about US$750 if one converts the income figure in yuan to US dollars using the official exchange rate of 8.3 yuan per dollar, but it was 4 times this amount or US$3,000 if we allow for the higher purchasing power of the yuan than that indicated by the official exchange rate (see section 5.6 for the conversion rate of 2 yuan per dollar according to purchasing power parity; see also Ren and Chen 1995). Third, a higher birth rate resulting from relaxing the one-child policy will not slow down the growth rate of real GDP substantially. In the last two decades of the twentieth century the average annual rate of growth has been about 9.5 percent. Not only is this growth rate large enough to absorb a population growth rate of less than 1 percent in 1998 as shown in table 9.1, but the population policy is unlikely to affect the natural growth rate by more than 0.5 percent, as we have not uncovered a substantial effect of the policy from the data in table 11.1. Thus there is no economic need for this policy and its effect on the per capita GDP growth rate is so small as to make it unnecessary.

Having dispelled the common justifications for the policy, we turn to its possible harmful effects. First, from the long-run economic point of view, human capital will be needed in the future for China's continued development, and human capital starts with human beings. Today a child might be costly, but 18 years from now (if not sooner, as in the countryside) the adult will be productive. Without giving birth to children today how can we have sufficient human capital in the future? In particular, the one-child policy will lead to an unreasonably high ratio of old people to the working population, making it difficult for the working population to support the senior population. Second, the family structure of China will be distorted by the policy as the relationships between brothers and sisters, nieces and nephews, aunts and uncles, will disappear. The single child is often spoiled by the parents and two sets of grandparents. Third, the policy is an infringement on the freedom of the Chinese people. In no other country in the world does, and in no other time throughout Chinese history did, the government decide arbitrarily on the number of children each family is allowed to have. It would not be an infringement of freedom to use economic incentives, such as charging a higher cost for public education for the second and third child, or to provide information, such as knowledge of contracep-

tives and family planning, to help reduce the national birth rate. Let anyone who favors the current policy be subject to it and she would likely become more critical. If we do not like it for ourselves why should we wish it for the people living in China? Besides being an infringement on the rights of citizens, the policy has negative effects on the economic development of China. For one thing it makes the quality of life worse for Chinese families, possibly affecting the willingness of educated Chinese living overseas to return home.

In summary, the arguments in favor of the one-child-family policy are not well supported. The possible harmful effects of the policy can be serious. There is even an argument that a larger population is beneficial to a country's economic growth. According to this argument, economic growth depends on new knowledge being applied to an economy, as new knowledge is an important factor for increasing total factor productivity. If there are more people there will be more new knowledge created for two reasons. First, more people provide a larger market and make it more profitable to produce and adopt new knowledge. Second, having more people increases the probability of having a sufficiently large group of talented people to do the research for technological innovations. Certainly it is much easier to select a thousand very talented people from 1 billion than from 200 million. It is the top of the research team that does the most innovative work in acquiring or applying new knowledge for the benefit of economic growth. China has benefited from a large population from which very talented people have been selected. Some of them have appeared in top graduate schools around the world.

11.5 Economic Explanation of the Birth Rate

Why did increasing per capita income in many developed countries lead to a decrease in the birth rate?

An answer can be provided by performing a cost and benefit analysis of having children. On the benefit side, children are productive for farm families, but become less so when the farmers use more technology to replace human labor in production and many farmers transfer out of agriculture to nonfarm activities. As urbanization takes place, the benefits of having children for production decrease while the costs of having children increase. The costs include higher rental for a larger family, or, until recently in China, more congestion in urban housing, high education costs in urban areas, and the high cost of taking away valuable time from the mother who can work. In addition, rich urban families demand high-quality education for their children. All these economic forces are at work on the Chinese mainland, as they have been in Taiwan and in other more developed areas. It is understood that people do not produce children entirely for economic reasons. However, to the extent that economic considerations are important, an analysis based on economic calculations can yield a fruitful explanation and prediction of the birth rate.

Becker (1981: 95–102) applies the traditional theory of demand to explain the number of children that a family decides to have. Let the utility function of a family be written as

$$u = u(n, Z)$$

where n denotes the number of children and Z denotes the quantity of consumption goods. The budget constraint is

$$pn + \pi Z = I$$

where p denotes the cost per child, π denotes the price per unit of consumption goods, and I denotes full income, which includes nonlabor income plus the maximum labor income that can be earned by using all the time available to the adult family members. The cost of having a child includes the market goods the child consumes and the cost of time spent by the parents in rearing the child. As in traditional theory, the consumer unit is assumed to maximize the above utility function subject to the stated budget constraint. The demand for children derived from this maximization process is a function of the relative price of a child and full income. An increase in the relative price of children, or in the ratio of p to π, will reduce the demand for children relative to consumption goods if real income is held constant. This is the substitution effect of a change in p. Under normal circumstances, an increase in income will increase the demand for children.

Becker (1981: 86–7) cites evidence that over the last several hundred years farm families have been larger than urban families. Part of the explanation is the low cost of rearing children on farms, including the costs of food and housing. Furthermore, the net cost of rearing children is reduced if they contribute to family income by working. Insofar as children have been more productive on farms than in the cities, the net cost of having children is lower for farm families. As an economy develops and agriculture becomes more mechanized, the cost advantage of raising children on farms is reduced. This may explain why urban–rural fertility differentials have narrowed in developed countries during the twentieth century, and even disappeared in the United States. The increase in earning power of women in the past 100 years in developed countries is a major cause of both the increase in the participation of married women in the labor force and the decline in fertility rates, the latter due to the increase in opportunity cost of rearing children. The increase in the earning power of women in China has probably had the same effects since the 1960s.

Besides economic calculations, the availability of birth control methods also affects the fertility rate. Becker (1981: 99–102) believes that the effect is small for three reasons. First, the simple birth control methods of increasing the marriage age, reducing the frequency of coition, and prolonging breast feeding that were known and practiced for centuries are already quite effective in reducing the fertility rate. Second, some evidence, including the high birth rate of poor Indian families that were informed of and encouraged to use birth control methods, suggests that the methods may not be very effective. Third, the methods are not necessary to reduce fertility because we have observed large reductions in fertility in many societies before these methods are developed. The relevance of the third point to the Chinese situation is the reduction in the birth rate in China from 35.05 per thousand in 1966 to 18.21 in 1980, without much government intervention.

Concerning the income effect on the demand for children, Becker (1981: 102) cites cross-section evidence of the positive relation between family income and the number of children. However, there are also instances of negative relations between income and fertility. One possible explanation is that the cost of having children

increases with income because the wives of men with higher incomes tend to have higher potential or actual earnings also. The observed relation between the number of children and family income is a combination of the income effect and the price effect, and not a pure income effect, holding the price of rearing children fixed. One important lesson from this economic analysis of the fertility rate is that economic considerations may be more effective in influencing the birth rate than coercion, and that a government wishing to reduce the birth rate may find economic means to achieve its objective preferable to coercion.

The above analysis of the economic factors which lead naturally to a reduction in the birth rate as an economy becomes more urbanized and as more women participate in the urban labor force, applies to China. The reduction of the birth rate in China from 23.33 in 1987 to 16.03 in 1998 might be explained, partly at least, by these factors. As casual evidence, one hears more and more urban families in China expressing a desire to have a small family. If these forces are at work, the coercive one-child-family policy becomes unnecessary even for those who think that China's population should grow slowly. One additional factor that may further reduce the birth rate in China is the provision of social insurance for old age to a wider group of people than the staff and workers in state-owned enterprises, which the government has been instituting since the September 1997 report of General Secretary Jiang Zemin quoted in section 4.1. Chinese families desire children partly to provide security for old age. Social insurance will reduce the need for children as providers in old age and thus lead to a reduction in the birth rate.

References

Almanac of China's Economy, 1981. Hong Kong: Modern Cultural Co. Ltd., 1982.
Becker, Gary S. *A Treatise on the Family*. Cambridge, MA: Harvard University Press, 1981.
Lewis, W. Arthur. *The Theory of Economic Growth*. Homewood, IL: Irwin, 1955.
Ren, Ruoen and Kai Chen. "China's GDP in US Dollars Based on Purchasing Power Parity." Working paper. Washington, DC: World Bank, Jan. 1995.

1. Using the data provided in the text for the years 1958 to 1961 while discussing the death and birth rates of table 11.1, (a) estimate the extra deaths during these four years in China in millions of persons, assuming the normal death rate to be 10.80 per thousand, the rate in 1957; (b) estimate the number of babies which would have been added to the population in these four years assuming the normal birth rate to be 34.03 per thousand as in 1957.
2. What are the economic explanations of the changes in the birth rate? Try to explain the Chinese birth rates in the last half century using the relevant explanations.
3. Are you in favor of or against the one-child policy in China? Give the reasons for your answer.
4. Do you believe that the one-child policy in China has been effective in reducing the birth rate? Cite some evidence for your answer.