CHINA'S ONE-CHILD POLICY AND ITS IMPACT ON POPULATION AGING

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TABLE OF CONTENTS

1. INTRODUCTION

China,[1] the world's most populous country, counted a total population of 1,133,682,501 people in 1990, according to the China's Fourth National Census, constituting 21 percent of the world's total population and fully 28 percent of the population in developing countries. The persons of age 65 or older are 66 millions and account for 5.9 percent of its total population. Since China's landmark 1982 census, the population has grown 1.47 percent a year on average. This growth rate is very low for a developing country, but in the context of China, it has meant an additional 126 million people in only eight years. To slow the population growth rate in order to cope with problems emerging from its fast growing population, the government launched the most ambitious family planning campaign in the world. A specific policy in the campaign is to limit each couple to only one child. If this policy is successful, China would stabilize its population at 1.2 billion, a target announced in 1979, by the end of the century or soon after. The ultimate goal set up in 1979 is to achieve zero population growth by the year 2000.[2] However, according to a population projection,[3] if the one-child-per-couple policy can be strictly and successfully implemented, the average population growth rate in the year 2010 will be -2 per thousand, and will decline thereafter.

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[1] China in this paper means the China mainland, or the People's Republic of China.

[2] Qian Xinzhong, "Discussion on Family Planning," Beijing Review, vol. 22, no. 28, 1979, p.14.

[3] Keyfitz Nathan and Flieger Wilhelm, World Population Growth and Aging, The University of Chicago Press, Chicago, 1990, pp. 132-136.

Persons age 65 or older will account for 8 percent in 2000, which will place China in the "aged" category,[4] and will keep increasing for the next several decades. The impact of such a rapid reduction in the population growth rate and sharp increase in the proportion of aged people may in fact lead to unforseen demographic, social and economic problems in the near future that are also becomimg an issue in a number of Western countries. In particular, such a policy would make the Chinese population the most aged one in the world.[5]

The objective of this paper is to show that, although the current one-child-per-couple policy in China is making progress on reaching its target of slowing population growth, it will face with a sharp population decline, and accompanied population aging problem. Eventually it impedes the realization of the national governing principles of this socialist country to satisfy people's growing material and cultural demands and to maximize social welfare of all the people, and it hampers the development planning objectives of social justice, rapid economic growth and sustained development. The policy causes frustration, human misery and will have a sustained negative impact on China's long-run modernization plans, despite efforts made to promote economic development. The study also suggests that instead of putting all emphasis in population control itself, China should adopt a more open and liberal economic policy. This will not only promote voluntary family planning and improve the public social security system, but it will also help solve the ultimate problems of economic backwardness.

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[4] Population Bulletin, China's Demographic Dilemmas, vol. 47, no. 1, 1994, p.17.

[5] Wu Cangping, "Some Population Problems That Should be Deliberated upon at an Early Stage", World Economic Herald, No. 165, 1983 and "The Two problems Which We Should Pay Attention To", Economic Digest, No. 4, 1984.

There are six sections in this paper. The background of China's one-child-per-couple policy and its evolution will be discussed in section two. The important negative impacts of one-child policy--aging population will be analyzed in section three. In section four, a mathematical model of population projection will be studied. Also some policy implications will be presented in section five. The last section provides a summary and conclusion.

As a new discipline, Chinese population research is impeded by inadequacies in the underlying theory as well as methodological shortcomings. An additional problem is the severe shortage of information, especially statistical data. It is extremely difficult to get relevant, up-to-date information, especially on the negative aspects of the current population policy. And also data and information from unofficial channels are inappropriate to be referenced. For these reasons, most of the references in this paper are to publications in Western countries. Some direct observations are also reported in this paper.

2. BACKGROUND OF CHINA'S ONE-CHILD-PER-COUPLE POLICY

China's total population first passed the 400 million mark about 1850.[6] This landmark event had its quiet beginning in the late 1600s as living conditions improved enough to support sustained, slow population growth over the following two centuries. But, amid internal upheavals and external incursions, demographic growth stagnated. The population hovered around 426 million as the 20th century opened. Civil warfare, natural calamities and foreign invasions continued to play havoc with China's hundreds of millions during the first half of the present century. Incomplete population counts reinforce the perception of demographic stagnation. When the People's Republic of China was established in 1949, the events that unfolded since the 1950s are part of one of the fastest, if not the fastest, demographic transitions in history.

In this section, a brief review of the major events that occurred after 1949 when the Communist Party established the new government and the underlying policies which caused the events are presented. These events and policies determined the direction of Chinese population growth trend. Inconsistent population policy and inappropriate economic policy were mainly responsible for the current population problem. Also, the origin of the current one-child-per-couple policy and its evolution will be discussed in order to better situated and to formulate the problem of this study.

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[6] Fan Wenlan, The General History of China, Beijing University Press, 1981, p. 11.

1). POPULATION GROWTH BETWEEN 1949-1990

The establishment of the People's Republic of China in 1949 marked the end of over a century of national and civil wars on Chinese territory and brought peace, as well as a period of unprecedented population growth. (See figure 1, constructed with the data from table 1). The first national census, taken in 1953, recorded a larger than expected population of 583 million. Since then, there have been three additional national enumerations in 1964, 1982 and 1990.

In between the censuses, year-end population estimates appeared intermittently. The quality of these estimates suffered in part because of the 20-year neglect of demographic affairs and studies in China after 1957.

Starting from a population estimated at some 540 million in 1949,[7] the annual rate of growth was above 2 percent a year from 1949 through 1957, largely due to the rapidly falling death rate. Over 104 million people were added in these eight years. This was the first of two population booms since 1949, with the second coming between 1963 and the early 1970s.

The 1953 census reported a total population of 583 million, and the 1964 census a total of 695 million. The total gain within this interval was 112 million, or an average annual growth rate of about 2.3 percent. This gain would have been higher had it not been interrupted by the sharp drop in the birth rate and rise in the death rate after the Great Leap Forward when China was facing famine, resulting from Mao Zedong's crash program to decentralize industry and to collectivize

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[7] Fan Wenlan, The General History of China. Beijing University Press, 1981, p. 12.

Table 1. TOTAL POPULATION

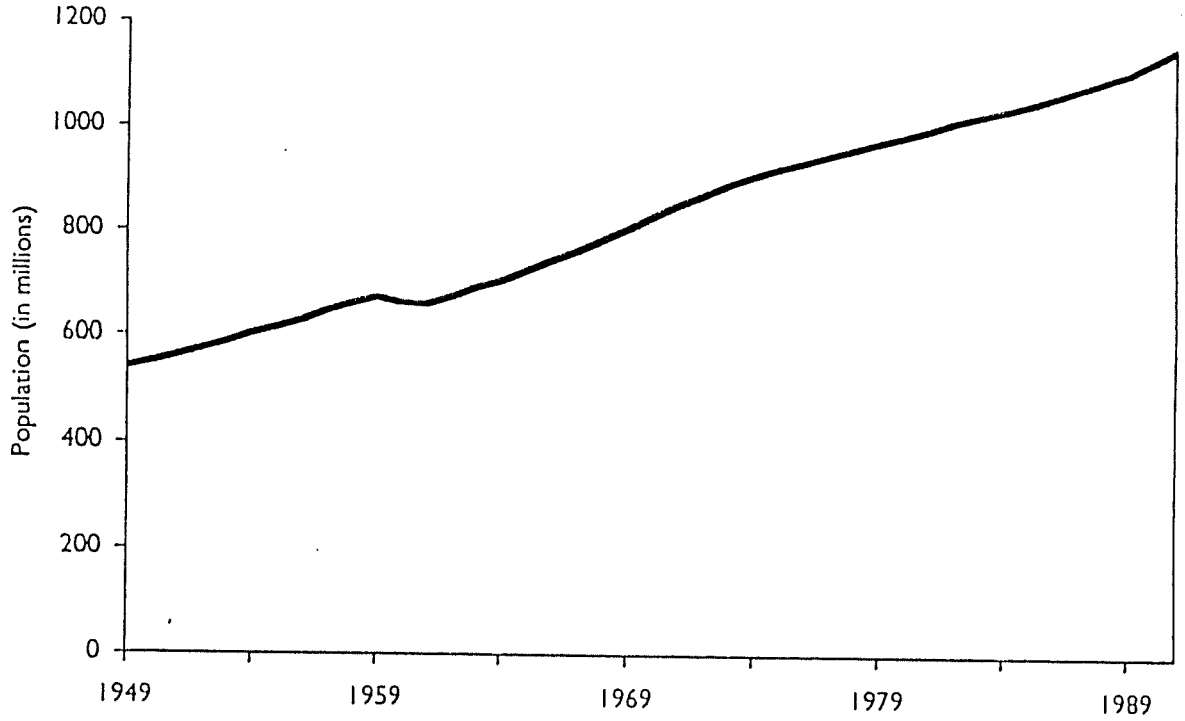
(End of the year)

(million)

YEAR	TOTAL POPU.	URBAN	RURAL
1949	541.67	57.65	484.02
1950	551.96	61.69	490.27
1951	563.00	66.32	496.68
1952	574.82	71.63	503.19
1953	587.96	78.26	509.70
1954	602.66	82.49	520.17
1955	614.65	82.85	531.80
1956	628.28	91.85	536.43
1957	646.53	99.49	547.04
1958	659.94	107.21	552.73
1959	672.07	123.71	548.36
1960	662.07	130.73	531.34
1961	658.58	127.07	531.52
1962	672.95	116.59	556.36
1963	691.72	116.46	575.26
1964	704.99	129.50	575.49
1965	725.38	130.45	594.93
1966	745.42	133.13	612.29
1967	763.68	135.48	628.20
1968	785.34	138.38	646.96
1969	806.71	141.17	665.54
1970	829.96	144.24	685.68
1975	924.20	160.30	763.90
1978	962.59	172.45	790.14
1981	1,000.72	201.71	799.01
1984	1,034.75	239.03	795.72
1985	1,054.44	249.90	804.53
1989	1,127.00	295.27	831.73
1990	1,143.00	302.89	840.11

Sources: 1 China Statistical Year Book, 1989.
2 World Bank, China: Strategy for Reducing Poverty in the 1990s, 1992.

Figure 1 **Population in China, 1949-1990**



Source: National Family Planning Commission of China.

agriculture. The radical economic policies of the Great Leap Forward caused a temporary reversal of the sharp declining trend of mortality. Right after the Great Leap Forward, the total population decreased in 1960 and 1961 for the first time since 1949, and went back to the 1959 level in 1962. Rural population decrease represented the major share. The death rate reached the ever high record and the natural growth rate for the first time was negative.[8] According to the China's Statistical Yearbook which was published in 1984, the infant death rate increased drastically after 1958 after a smooth decrease for the period since 1949. (See figure 3). As infants are more sensitive to any

[8] See figure 1, constructed with the data from table 1.

change of environment and living conditions, such a sharp increase of the infant death rate is the main reason for the sharp increase of the aggregate death rate. Also after another smooth decrease, the infant death rate started to increase in 1979, which was the year when the government began to introduce the one-child-per-couple policy. Like the case from 1958 to 1961, this increase, accompanied by the continuous improvement of medical care and social service system, can only be the result of an unusual external disturbance.

Soon after the Great Leap Forward crisis, a more liberal economic policy was launched, and population growth quickly rebounded after 1961 as the birth rate resumed its traditionally high levels when economic conditions improved, the growth rate averaging 2.6 percent a year from 1962 to 1970---the highest level since 1949. The recovery in 1962 reached a level similar to the total fertility rate in the 1950s, and peaked at 7.5 in 1963. The total fertility rate in the mid to late 1960s remained close to levels of the mid-1950s except for a temporary decline in 1967 coinciding with one year after the start of the Cultural Revolution. The 130 million net gain marked the second population boom.

Had the pace of the mid-1960s persisted, the Chinese population would have doubled to more than 1.1 billion in the mid-1970s. Because of the subsequent sharp drop in fertility, China did not reach this total until the end of 1989. Behind this 15-year postponement lay China's phenomenal demographic transition from high to low fertility. The annual rate of growth dove to and has hovered around 1.5 percent or less since the mid-1970s, making earlier growth rates appear to be from a different nation. This is the direct result of the new one-child-per-couple policy which implemented in 1979, but the increase in absolute number has been substantial because of the huge

population base and the age structure of the population.

The present condition in China's population can be summed up in the following features:

(1) The population base is huge. By the end of 1989, the total population exceeded 1,133 million.

(2) Despite the sharp fall in the rate of population growth, the rate is still above 1 percent. Because of the large absolute size, the net absolute increase per year remains anywhere between 11 and 12 million, basically the same as in the 1950s.

(3) The population displays a high proportion of childbearing women in its structure. (See figure 2). China had huge cohorts born in the high-fertility period of the 1960s, who reached their twenties during the 1980s. According to the fourth census in 1990, the number of women aged 21-30 increased from 81 million in 1983 to about 106 million in 1990, which is almost 9.36 percent of the total population.[9]

(4) The rural proportion of the population is large. (See table 1). In 1990, the rural population made up 73.8 percent of the nation's total. Although this number is lower than the 89.4 percent in 1949, the absolute number has risen sharply--from 484 million in 1949 to 840 million in 1990. In the 1980s, the total fertility rate (TFR) never fell below a 2.5 child-per-woman average in rural areas, although it dropped to about 1.2 in urban areas. The big size and the high birth rate of rural population had a direct bearing on the trend of population growth. (See figure 4).

(5) The aged proportion of the population is increasing. The persons of age 65 or older amounted to only 4.9 percent of the Chinese population in 1982. The 1990 census placed their share

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[9] Statistical Yearbook of China 1990. Beijing: China Statistics Press, 1990, p. 172.

at 5.9 percent. And also the number involved is so large. In 1980, the population of age 65 and older totaled almost 50 million persons. Their numbers increased to about 66 million in 1990,[10] a figure close to the combined populations of the four largest U.S. states: California, New York, Texas, and Florida.

2. THE ORIGIN OF THE ONE-CHILD POLICY AND ITS EVOLUTIONS

Since 1949, the science of demography has been viewed with suspicion and hostility by most of China's party and government leaders. This is an unfortunate legacy of the writings of Karl Marx a century ago who had attacked Thomas Malthus' views of the relationship between population growth and food supply. Social scientists who warned of the potential economic problems of continued rapid population growth were denounced as "Malthusians" and were severely criticized. Chief among them was the famous economist Ma Yinchu, who was removed from his position as the president of Beijing University and not rehabilitated until 1978. The chairman of the Chinese Communist Party Mao Zedong believed that revolution plus production would solve the problem of feeding and employing China's people. Mao's opinion on population can be viewed as "supply-side" perspective on population size and growth. This view sees each person as supplying a pair of hands--hands that when better organized through revolution--can enhance production. The larger the population, the greater the supply of hands, and thus the greater the total production. Maybe

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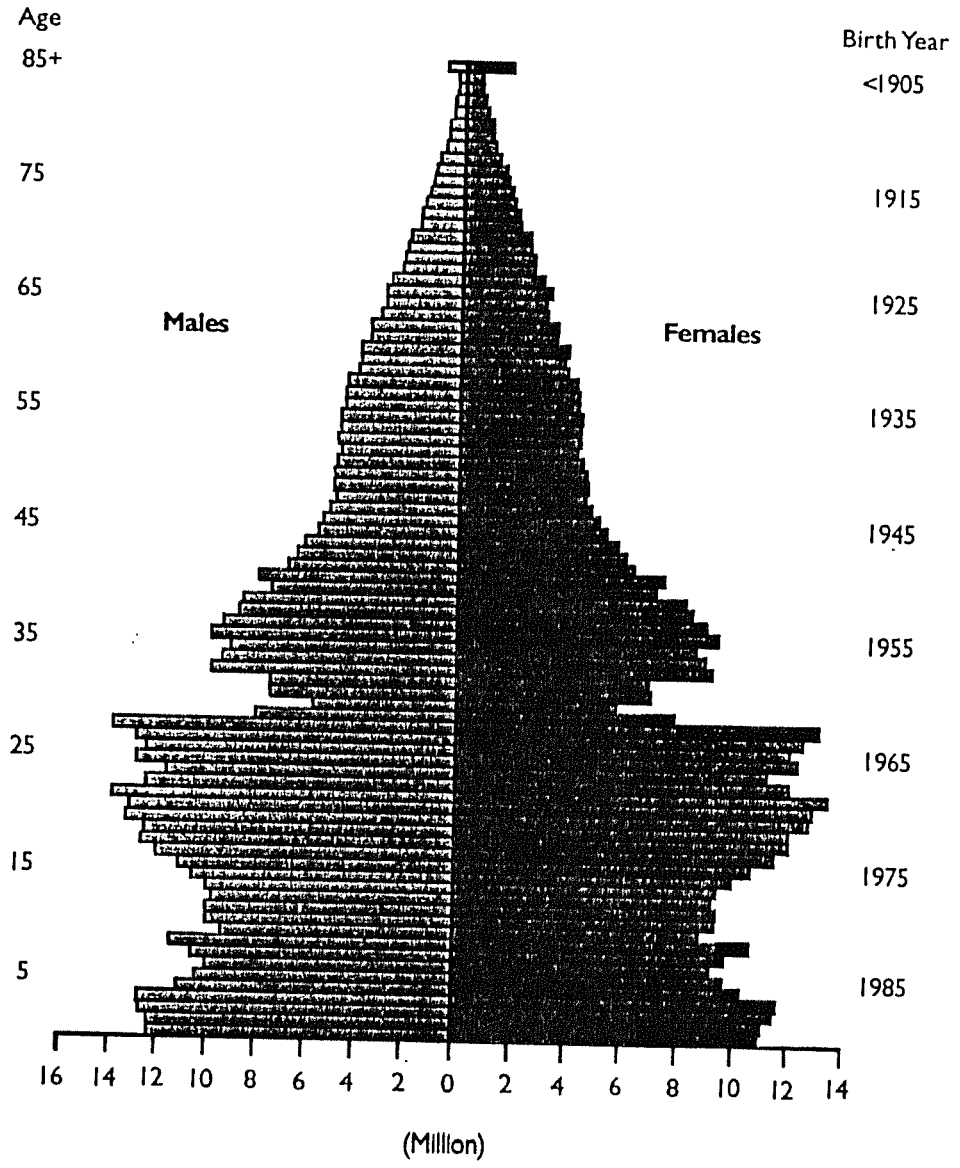
[10] Xiao Zhenyu and Tao Liqun, "China's Population Aging Trends and the Strategic Counter-measures," in Proceedings of the Fifth Conference on Population Science (Beijing: China Demographic Society, 1991), p. 291

Figure 2

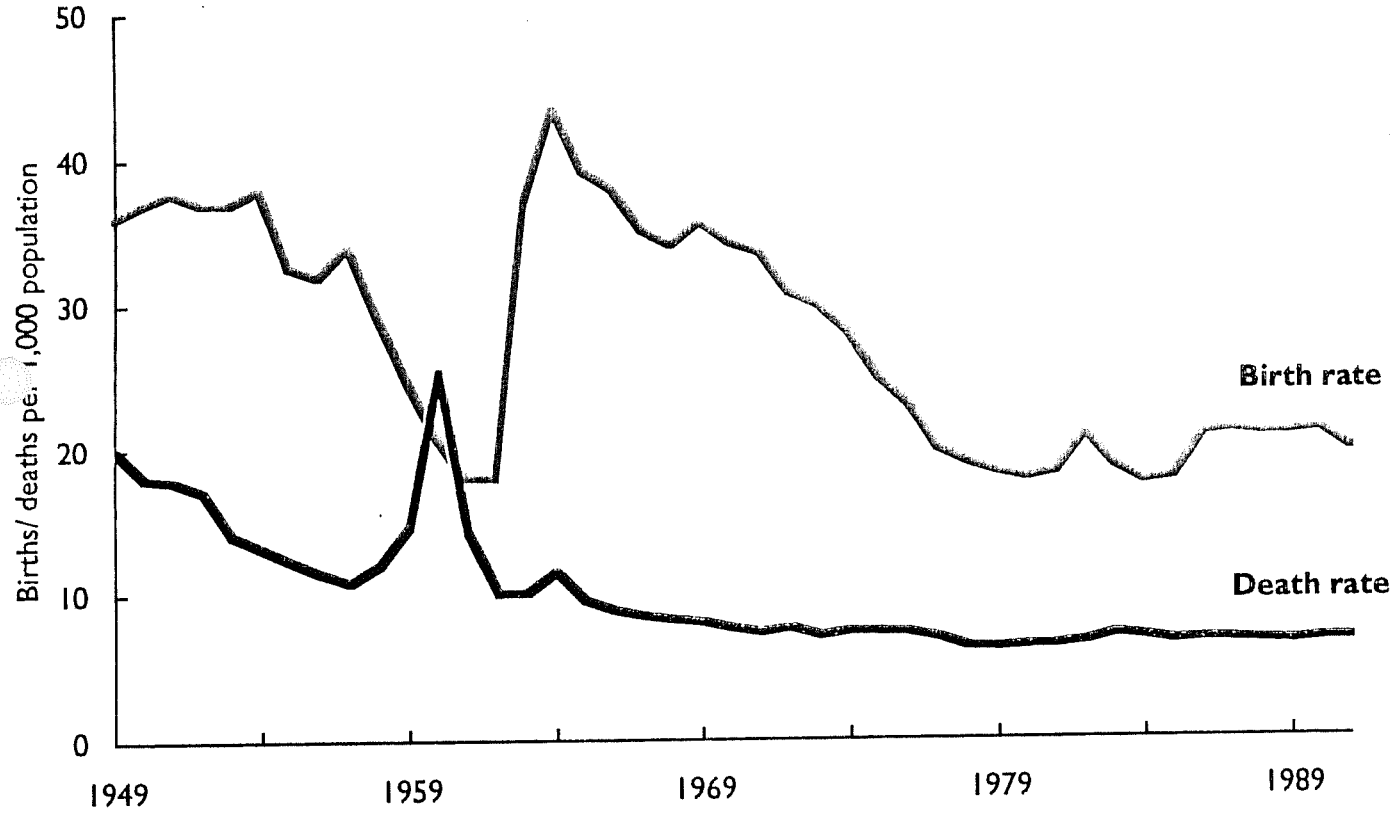
China's Population by Age and Sex, 1990



Source: *Ten-Percent Sampling Tabulation of the 1990 Population Census of China* (Beijing: China Statistical Publishing House, 1991), Table 4-1.

Figure 3

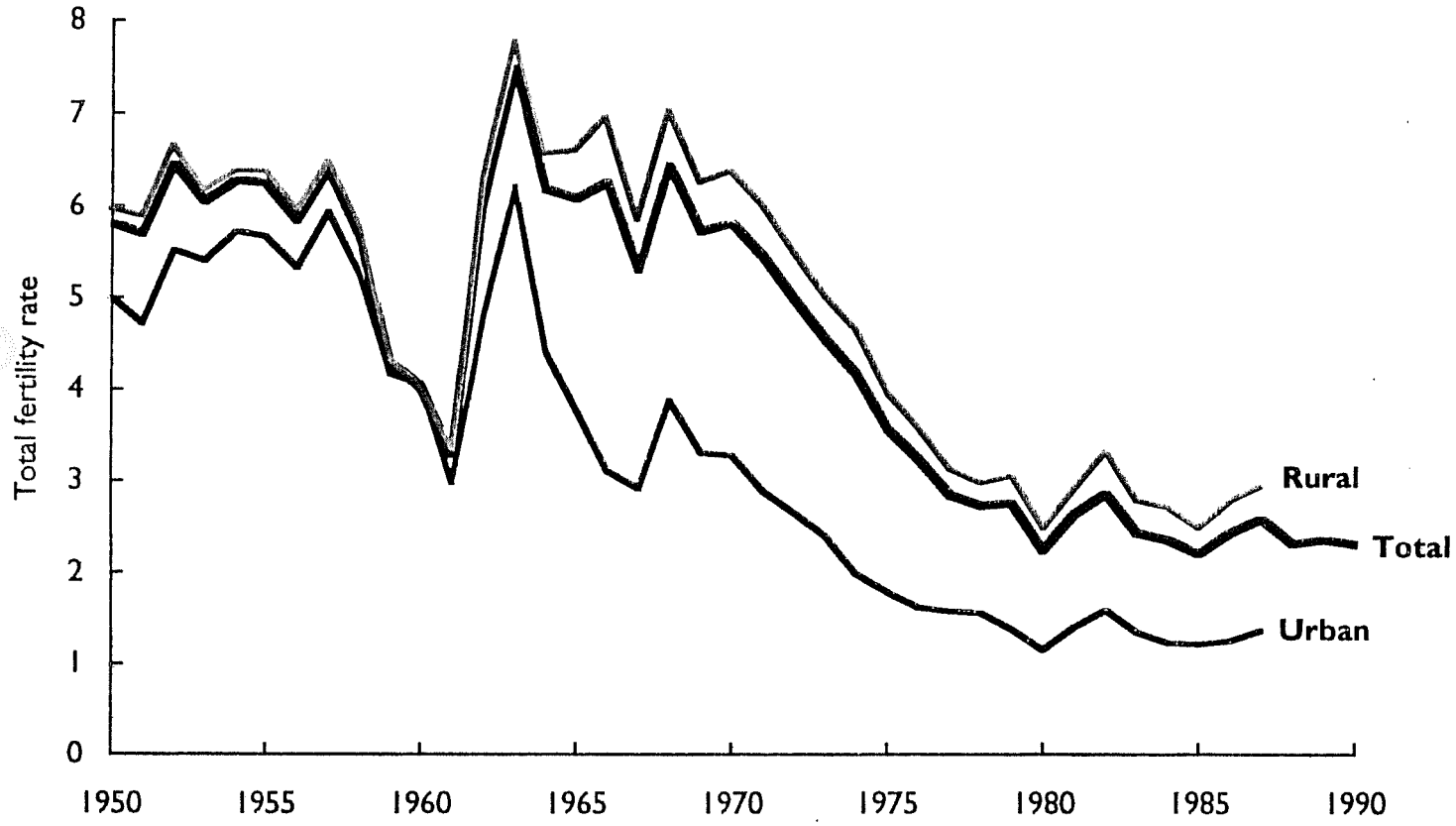
Birth and Death Rates in China, 1949-1991



Source: National Family Planning Commission of China.

Figure 4

Decline in Chinese Fertility, 1950-1990



Source: Compiled by the U.S. Bureau of the Census, Center for International Research.

this is due to Marx's theory that only labor can create value, although without some other factors of production, people simply cannot be productive. And instead of coming only with hands, each person comes also with a mouth, needing to be fed immediately. Demand for goods and services shoots up as mouth (births) multiply, thus straining resources. With the cohorts of the baby boom of the 1960s entering the marrying and child-bearing ages, some 10 million couples merely reproduce themselves with an average of two children per couple. This is the background of the one-child-per-couple policy.

Deputy Qian Xinzhong, minister of public health, said in 1979: "At the existing rate of population of 1,300 million by the end of the century . . . We plan to slow the country's natural rate of population growth to around 5 per 1,000 by 1985 . . . This means that on the average each couple as of now can have only one child."[11] Since 1979, the government position has changed from simple encouragement of the one-child family to insistence that almost all couples stop at one healthy living child, in order to achieve the ambitious targets of 0.5 percent growth in 1985 and zero growth rate in the year 2000. With the growing fears of rural instability which results from the coercive enforcement of one-child policy, the government adopted a progressive relaxation of rural policy between 1984 and 1989. By 1989, a "one-son or two-children" policy was in effect in some rural areas;[12] in other words, couples whose first child was a daughter gained the right to have a second child after an interval of several years. But the one-child policy was strictly implemented in urban

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[11] Qian, Xinzhong, "Discussion on Family Planning", Beijing Review, Vol. 22, No.28, 1979, p. 14.

[12] Tyrenne White, " Birth Planning Between Plan and Market: The Impact of Reform on China's One-Child Policy", China's Economic Problems, 1991, pp. 252-258.

areas from 1979 to now. Also the Chinese government insists that the average total fertility rate must be controlled at the level of 1.3 child-per-woman.

3. AGING POPULATION--ONE RESULT OF ONE-CHILD-PER-COUPLE POLICY

Although the one-child policy successfully limited the population growth rate to a very low level, such a rapid transition to low fertility and mortality has created some socio-economic problems. One of them is the aging population, an increase in the proportion of elderly. Elderly Chinese, like infants and young adults, also have come into the limelight in the aftermath of China's rapid mortality and fertility transitions. A lively graphic representation showed the severity of this problem: A young couple is sandwiched between four aged parents and one young offspring, creating a 4-2-1 population pyramid.

The possible emergence of such an abnormal age structure was a hot topic among population specialists and others in China. Numerous population projections appeared and were used as evidence in the course of the debate. The various series of the projections, interestingly enough, yielded nearly identical numbers of persons of age 65 and over for any given year in the foreseeable future. This reflects the general view that, with mortality already at low levels, further drops are unlikely to occur and that the size of the elderly population can be projected with a fair degree of certainty. Future fertility, therefore, will have a greater influence than mortality on population aging in China.

Although the Chinese population is not yet "aged," By international standards[13], a population

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[13] United Nations, The World Aging Situation: Strategies and Policies, New York, 1985, p. 7.

is aged when persons of age 65 or older accounts for more than 7 percent of the total population. Such individuals amounted to 5.9 percent of the Chinese population in 1990. Barring unforseen changes in fertility and mortality, at least 7 percent of the population will be of age 65 or older in the year 2000, placing China in the "aged" category. And also the number involved is so large. The projected annual additions to the 65 and older population will amount to 4.5 million persons between 2020 and 2030.[14]

In fact, population aging has already begun in China's cities. During the 1990s, China's urban population will experience the aging of their labor force as the huge cohorts born in the 1950s and early 1960s begin entering middle age. The proportion of the urban population at ages 65 and above is expected to increase modestly from about 6 percent in 1990 to 8 percent at the turn of the century. This will not be a serious problem in the short run, but if China maintained its urban one-child policy, the elderly proportion of the urban population would rise from 8 percent in the year 2000 to 17 percent in 2020, 33 percent in 2040, and 36 percent in 2060.[15]

Age structure shifts in rural areas are a decade behind those in urban areas. But due to the huge rural proportion to the total population, the aging pressure will be very high at the beginning of the next century in the rural areas if China does not relax the one-child policy much more.

Population aging along with the introduction of the pension system has swelled the ranks of the retired. In urban China, their numbers jumped to 21.2 million in 1988 from 1 million in 1964.

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[14] United Nations, The Sex and Age Distributions of Population, The 1990 Revision, New York, 1991, pp. 132-133.

[15] Judith Banister, "China's Population Changes and The Economy," China's Economic problems, 1991, pp. 239-242.

The annual average net gain amounted to 1.6 million during the 1980s, and reached 1.8 million during the early 1990s.

Most urban retirees are covered by a pension system. On the other hand, the majority of persons of age 65 and older (50 million or more) live in rural areas and still lack any old-age security protection. The most recent data indicate that only some 3.9 million individuals qualify for benefits under village-run five-guarantee schemes (that is, guaranteeing grain, fabric, medicine, old-age care, and burial). The bulk of China's elderly in the villages are actually or potentially the wards of individuals, principally their own adult children. The very real value of children as providers of old-age security is part of the socio-economic reality that limit China's strategic demographic initiative.[16]

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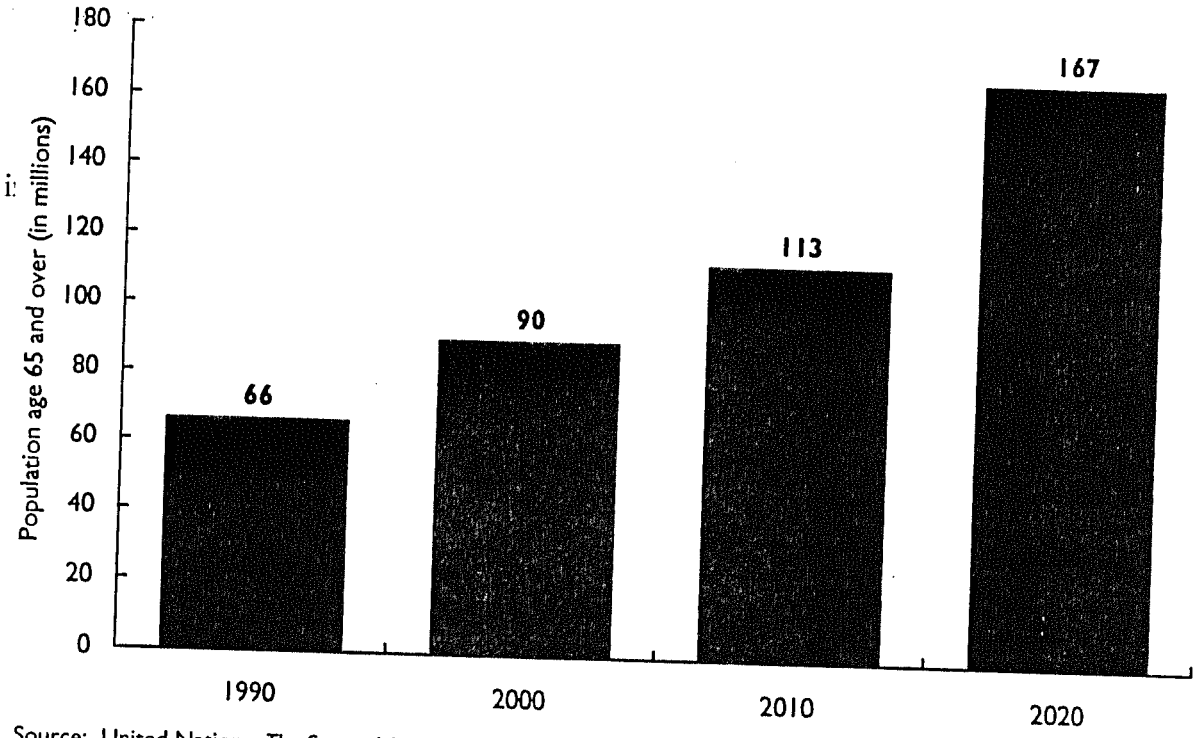
[16] Tien H. Yuan, China's Strategic Demographic Initiative, New York: Praeger, 1991.

Figure 5

Population Age 65 and Older in China, 1990-2020



Source: United Nations, *The Sex and Age Distribution of Populations, the 1990 Revision* (New York: UN, 1991), pp. 132-133.

4. POPULATION PROJECTIONS

To understand fully Chinese one-child-per-couple policy and its impacts on economic development and social welfare requires careful study of Chinese population structure and future trends. Population projections are the ideal approach to analyze population policy implications, since demographic dimensions are essential to most policy concerns. In this chapter, I will discuss some population models and analyses the impact of current Chinese population policy in economic development and social welfare. First I introduce the population growth function and the population projections based on different assumptions. The crucial determinant in the population growth function is the number of children per woman in fertility age, or the average total fertility rate (TFR). This variable will affect not only population size, but also affect population structure. Secondly, population age composition is discussed. According to the population projection, Chinese population will age significantly during the coming decades.

1. POPULATION GROWTH FUNCTION

The population growth function can be defined as[17]:

[17] In this projection, we assume that the mortality is constant. Since the mortality is already at very low level, further drops are unlikely to occur.

$$B(a, t) = N(t) \int_{18}^{50} s(a, t) * h(a, t) * p(a, t)\, da,$$[18]

Where a is age, t is time, s(a, t) is the female ratio function, representing the percentage of female from the total population within a given age interval a at year t, p(a, t) is the population density function, p(a, t)da representing the percentage of population of a certain age interval from the total population, h(a, t)da is the ratio of a certain interval to a woman's entire fertility age, B(a, t) is the number of new born children in year t, and N(t) is the number of children each woman produces in her fertility age period, i.e, the total fertility rate.

Within this model, we can express the effects of China's population policy quantitatively. For example, "To encourage late marriage and late child-bearing" will have the impact of increasing the value of lower limit a_1, which will reduce the fertility interval; If all women get married at 20, a_1 will increase from 18 to 20. If all women have their first child after age 25, then the fertility interval will be [25, 50] instead of [18, 50]. "To encourage late birth" will postpone the peak value of h in the model; and "to encourage fewer children" will reduce the average fertility ratio N, and so on.

The major concern in this paper is to examine the policy implications of different levels of N. The current Chinese population policy is equivalent to $N<1.3$. A simulation done by a group of Chinese scientists in demography, computer science, and control theory revealed some interesting

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[18] The model was established by the work of Song Jian, Tian Xueyuan and other Chinese scientists and first introduced in Population Projection and Population Control, Song Jian, Tian Xueyuan, Beijing: 1982, (in Chinese).

inferences. According to the projection,[19] there are several possible outcomes in the next 100 years, based on different population policy assumptions. The most important determinant is the average total fertility rate, the N in the model discussed above. Four projections have been made, for N= 2.3, 2, 1.5 and 1. The different projections of population are summarized below, starting with N=2.3.

(1). Population projection with N=2.3. With N=2.3, which was the fertility level in 1978, the total population will be 1.3 billion in 2000, 1.710 billion in 2030, 1.992 billion in 2060 and 2.254 billion in 2090. (See table 2). Under this assumption the population growth will increase at a decreasing rate. However, by 2090, China will have over 2 billion population, and this giant size is too big to be good, since given the expected growth in productivity, it will exceed the capacity of Chinese resources to support such a huge population. Therefore, even the old ratio is the most favorable one compared to that of N=2.0, 1.5, and 1.0, this fertility rate will never be accepted by the Chinese policymakers.

Table 2. POPULATION PROJECTION WITH N= 2.3

(Million)

YEAR	TOTAL POPU.	OLD POPU. (Above 65)	YOUNG POPU. (0-14)	OLD RATIO[20]
1990	1,133	66	285	0.06

[19] The result of the projection was redone by the head of the project, Song Jian, in 1990. Population Projection and Population Control, (Song Jian, Tian XueYuan, Beijing: 1990, in Chinese).

[20] The old ratio at year t is computed with the following formula:

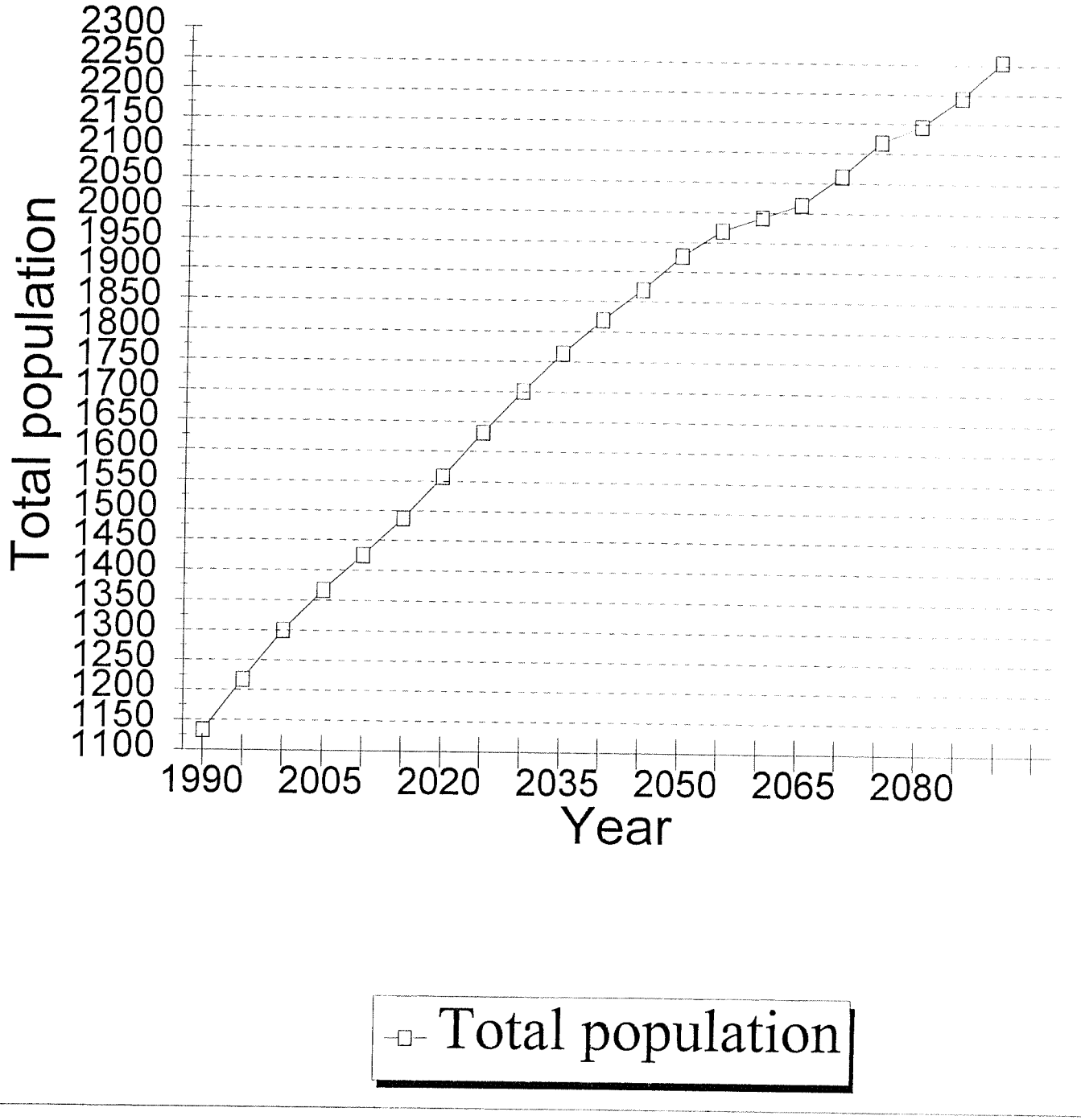
$$\text{Old Ratio}(t) = O(t) / P(t)$$

where O(t) is the number of old dependents, and P(t) the total population at year t, respectively.

1995	1,218	77	324	0.06
2000	1,300	92	354	0.07
2005	1,367	106	356	0.08
2010	1,425	121	337	0.08
2015	1,487	148	325	0.10
2020	1,558	189	335	0.12
2025	1,632	219	357	0.13
2030	1,701	279	370	0.16
2035	1,763	346	368	0.19
2040	1,819	398	360	0.21
2045	1,870	412	360	0.22
2050	1,927	431	372	0.22
2055	1,969	450	385	0.23
2060	1,992	466	391	0.23
2065	2,013	480	390	0.24
2070	2,061	508	390	0.25
2075	2,19	526	395	0.26
2080	2,146	535	405	0.25
2085	2,194	526	413	0.24
2090	2,254	518	426	0.23

Figure 6 POPULATION PROJECTION

with N=2.3 *(million)*



(2). Population projection with N=2.0. With N=2.0, which was the actual fertility rate in 1990, each couple has two children, the total population will keep increasing for 62 years. Total population will be 1,267 billion in 2000, 1.433 billion in 2020, 1.587 billion in 2050 and will reach the maximum of 1.59 billion in 2052, as can be seen from figure 7. Then it will begin to decrease in 2053 and in 2090, total population will be 1.512. And also the proportion of the aged people will reach its maximum level in 2075, then begin to decline. (See table 3). If everything else remains stable, both the population and the aged proportion will decline smoothly after 60-70 years and eventually reach the stage of stationary population, though this will entail a fairly long period.

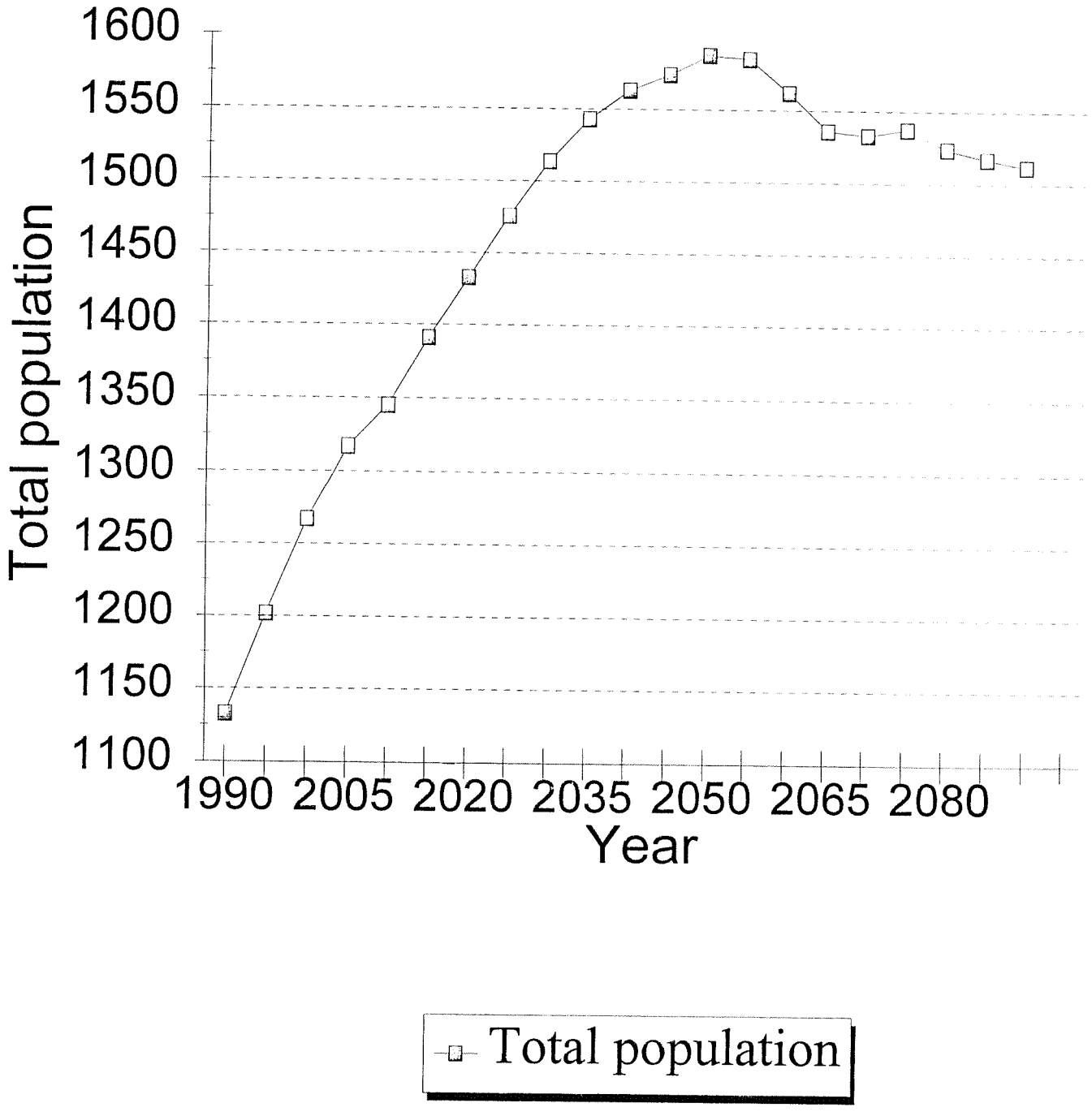
Table 3. POPULATION PROJECTION WITH N=2.0

(MILLION)

YEAR	TOTAL POPULATION	OLD POPU. (Above 65)	YOUNG POPU. (0-14)	OLD RATIO
1990	1,133	66	255	0.06
1995	1,202	79	280	0.07
2000	1,267	94	306	0.07
2005	1,317	108	305	0.08
2010	1,345	123	281	0.09
2015	1,391	150	260	0.10
2020	1,433	191	258	0.13
2025	1,476	221	269	0.15
2030	1,514	281	275	0.18
2035	1,543	348	269	0.23
2040	1,563	400	255	0.26
2045	1,574	410	247	0.26
2050	1,587	419	247	0.26
2055	1,585	425	250	0.27
2060	1,562	427	249	0.27
2065	1,536	426	243	0.28
2070	1,533	439	236	0.29
2075	1,537	448	232	0.29
2080	1,524	442	231	0.29
2085	1,517	435	229	0.28
2090	1,512	430	223	0.28

Figure 7 POPULATION PROJECTION

with N=2.0 *(million)*



(3). Population projection with N = 1.5. With N = 1.5, that is, half the families have one child and half have two children, and the nation's population will still be increasing for 42 years. Total population will be 1.215 billion in year 2000, 1.26 billion in 2020 and reaches the maximum value of 1.267 billion in year 2032. It will begin to decrease in 2033 and the total population in 2050 will be 1.172 billion. In 2090, the total population will decrease to 0.781 billion, approximately equivalent to the level in 1968. (See table 4). And the aged proportion will be 22 percent in 2030, it will reach its maximum level in 2050, and decline thereafter. In 2090, it will reach 30 percent of the total population. Though it still places China in the "aged" category for a long time, it will slow the population growth rate which is the biggest objective of the Chinese government. This assumption will lead to the most ideal target population, estimated by scientists based on China's resources, including space, in about a century.[21]

[21] Song Jian, and Tian Xueyuan, Population Projection and Population Control, Beijing, : 1982, p. 212.

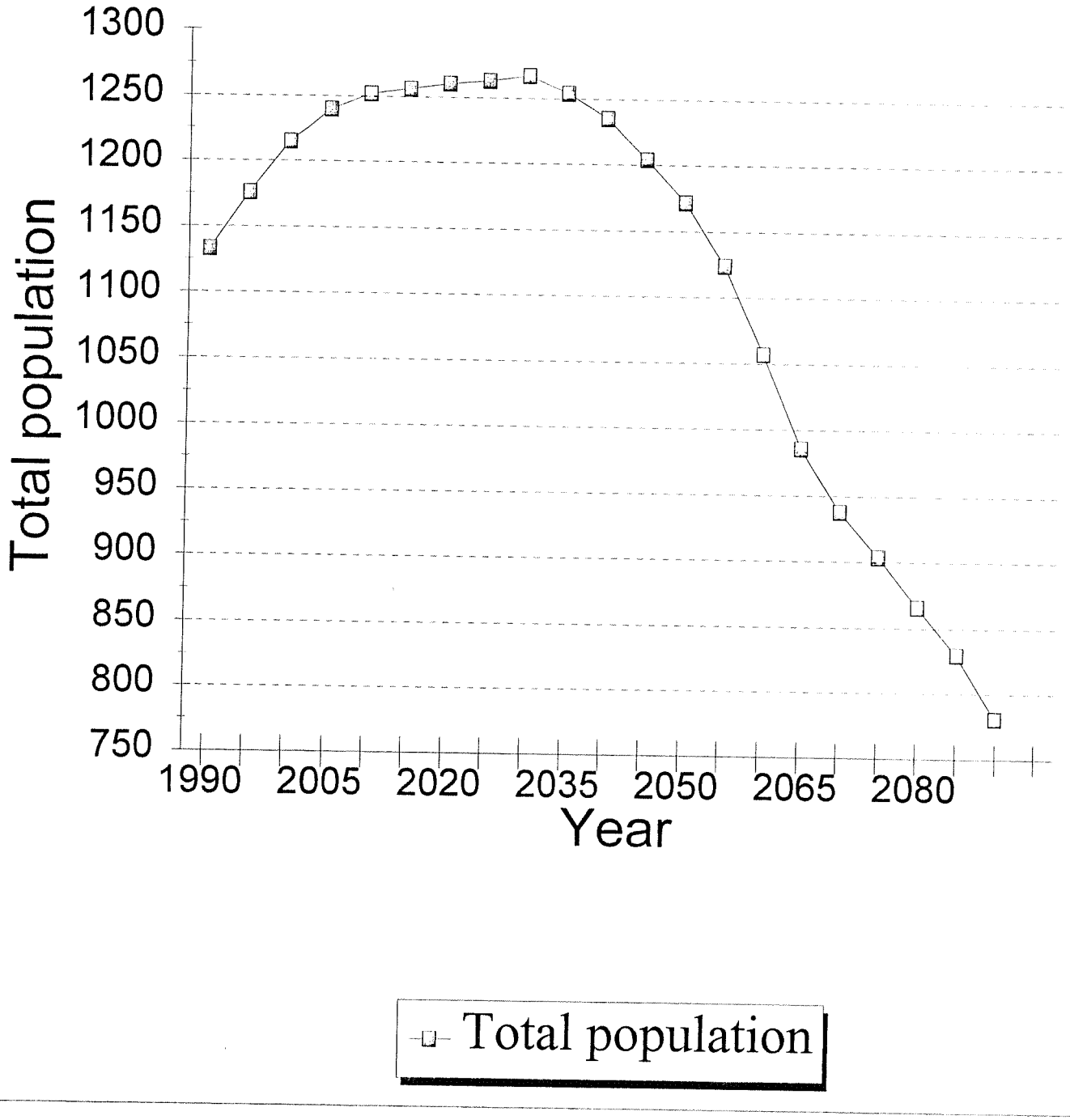
Table 4. POPULATION PROJECTION WITH N=1.5

(Million)

YEAR	TOTAL POPU.	OLD POPU. (Above 65)	YOUNG POPU. (0-14)	OLD RATIO
1990	1,133	66	255	0.06
1995	1,176	79	230	0.07
2000	1,215	94	229	0.08
2005	1,240	108	244	0.09
2010	1,252	123	233	0.10
2015	1,256	150	209	0.12
2020	1,260	191	181	0.15
2025	1,263	221	165	0.17
2030	1,267	281	162	0.22
2035	1,254	348	161	0.28
2040	1,235	400	153	0.32
2045	1,204	410	139	0.34
2050	1,172	405	126	0.35
2055	1,124	381	119	0.33
2060	1,057	352	114	0.33
2065	986	334	110	0.33
2070	938	312	103	0.32
2075	904	296	99	0.32
2080	866	274	96	0.31
2085	830	249	89	0.30
2090	781	234	84	0.30

Figure 8 POPULATION PROJECTION

with N=1.5 *(million)*



(4). Population projection with N=1.0. With N=1.0, which is the current population policy target in China. This means that if every couple is allowed to have only one child for a century, the total population will still increase for 25 years and will reach its maximum level of 1.194 billion in 2014.[22] Total population will begin to decrease in 2015 and will reach 1.137 billion in 2030, 0.937 billion in 2060, 0.519 billion in 2090.[23]

From table 4, we can see that, based on pure computation, the old age rates will be over 30 percent after the year 2035, and in 2090, only 35 percent of the total population will be of working age. It is obviously another extreme policy effect, compared to the first scenario with N=2.3, as we discussed earlier. As we continue our study, we will find out that this option is harmful to the Chinese economy.

From the last column of Table 4, we can see that in 1990, the old ratio was 0.06, which means that only 6 percent of the total population represented the older people. However, by 2055, 42 percent of the total population will be aged people, and in 2090, if we assume the policy is still in place, the old dependents will comprise 55 percent of the total population. Such an aging population will put a heavy burden on the working people.

The above projections are mathematical computations, but they can be used for reference when thinking about population policy and program. From these mathematical projections, we can

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[22] See figure 9, constructed with the data in table 5.

[23] See table 5. Recently, the government allows some couples with special reasons and some of those in rural areas to have a second child. To some extent, this indicates that the radical one-child approach is not practical. The result of the projection with N=1.0 shows that this approach is very unrealistic and very difficult to achieve.

infer that the population growth trend is strongly influenced by government policy.[24] If each person has more than two children, the total population will substantially increase. But under the current one-child-per-couple policy, with the current population structure and base, the Chinese population will decrease substantially. Our discussion also demonstrates the well-known phenomenon of demographic momentum, which is the tendency for population growth to continue beyond the time that replacement fertility has been achieved. This is because of a relatively high concentration of population in the child-bearing years. The large cohorts of those born in the 1960s and 1970s will cause population to continue to grow for many years.

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[24] In China, the central government can strongly influence the most important variable N in our population growth function by strictly regulating the number of children per couple.

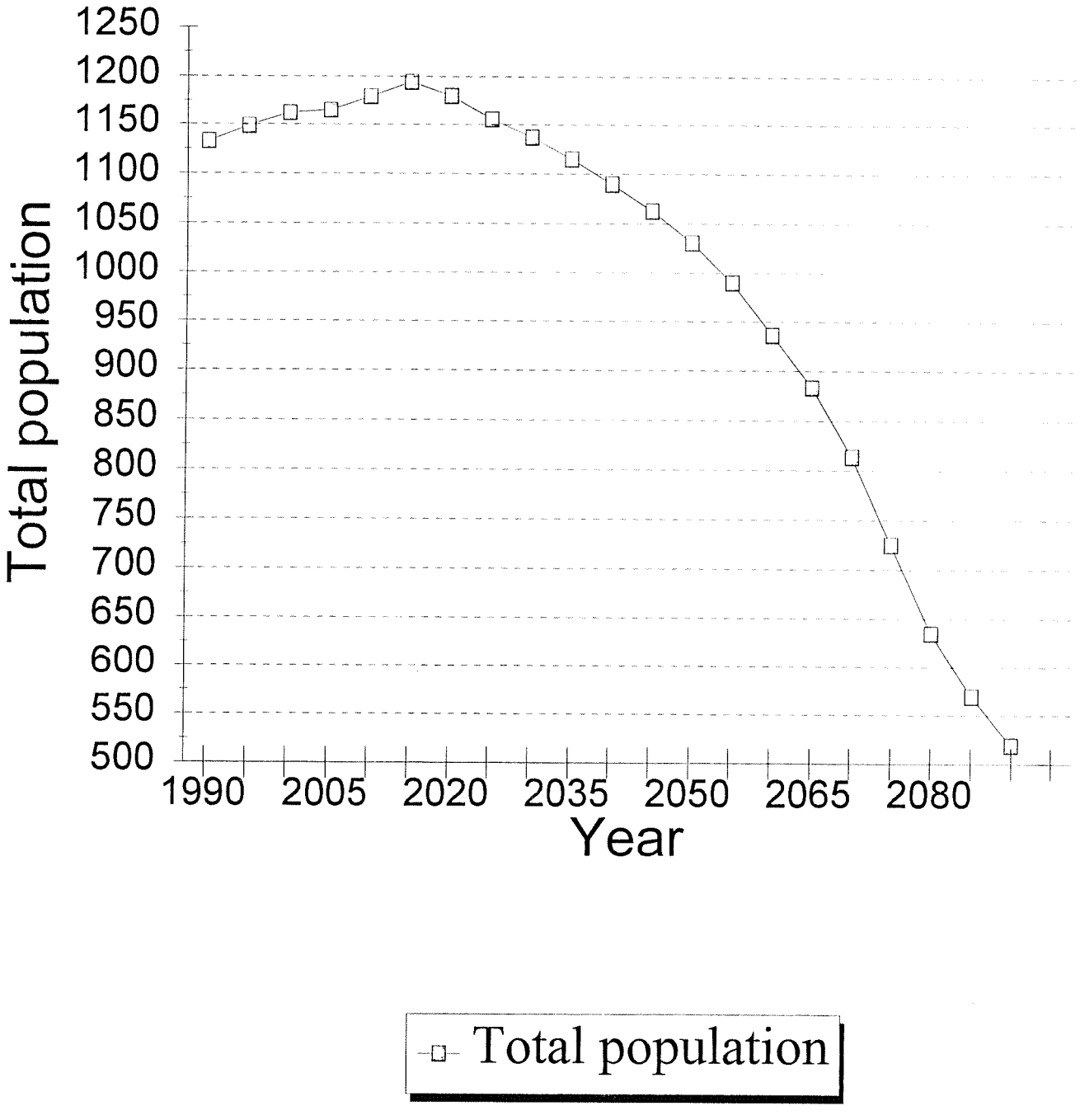
Table 5. POPULATION PROJECTION WITH N=1.0

(Million)

YEAR	TOTAL POPU.	OLD POPU. (Above 65)	YOUNG POPU. (0-14)	OLD RATIO
1990	1,133	68	255	0.06
1995	1,149	79	218	0.07
2000	1,162	94	190	0.08
2005	1,165	108	183	0.09
2010	1,179	123	181	0.10
2015	1,194	150	172	0.12
2020	1,180	191	163	0.16
2025	1,156	221	145	0.19
2030	1,137	281	138	0.24
2035	1,115	348	118	0.31
2040	1,090	372	106	0.34
2045	1,063	400	101	0.38
2050	1,031	402	132	0.40
2055	990	412	86	0.42
2060	937	414	77	0.44
2065	883	402	70	0.46
2070	813	384	65	0.47
2075	725	366	62	0.50
2080	635	339	58	0.53
2085	569	307	54	0.54
2090	519	285	51	0.55

Figure 9 POPULATION PROJECTION

with N=1.0 *(million)*



2. AGE COMPOSITION

Age composition is one of the most important economic and social aspects of a population. The economic, political, and other behavior of the representative individual changes with age both because mental and physical abilities improve with age up to a certain level and eventually deteriorate, and because intangible capital --such as concrete knowledge, learning skills, etc.-- accumulates with training and experience and with age up to a certain level. Social scientists of many types have a special interest in the age structure of a population since social relationships within a country are considerably affected by the relative numbers at each age. Age is an important variable in measuring potential school population, potential voting population, potential labor and labor force, and even in projecting consumption patterns.

A population's age structure is governed by the behavior of its age-specific mortality and fertility, particularly the latter. The constant rate of population growth (whether positive, negative or zero) characteristic of this stable population depends on the sets of age-specific fertility and mortality rates underlying this population. If age-specific fertility and /or age-specific mortality vary over time, the crude rate of natural increase and the age structure of the population will vary. For instance, the heavy mortality associated with war, famine, or virulent epidemics give rise to ups and downs in the segments of the age structure most vulnerable to these events, as was the case of China's great depression and famine from 1960 to 1962. Similarly, an upsurge of fertility after a war or a great economic depression will give rise to abnormally large cohorts, which thereafter move through a population as a pig swallowed by a large serpent moves through its body. In other words, great upsurges in births give rise to a series of echo effects every 20 or more years, but with every

effort to keep the fertility rate down, the absolute increase now is still significant. As we discussed earlier, the echo effect of the baby boom in 1960s will keep China's natural population growth high for years.

The wealth of a society is created by human beings, especially by people with working ability. People without working ability --senior citizens, handicapped, and children--need to be supported with the wealth produced by them when they had the working ability and by the current labor force. If labor force has to support a large non-working population in a country, the burden to the country is heavy.

In order to reflect this characteristic quantitatively, we now introduce the dependency ratio, which is defined as the number of persons in a population who are not economically active per 100 economically active persons in that population.

The dependency ratio SD at time t is the ratio between non-labor force and labor force, and it can be defined as

$$SD(t) = \{ P(t) - L(t) \} / L(t)$$

Where P(t) is total population at time t and L(t) is labor force at time t. Here L(t) is defined to be everyone from 15-64 who is either employed and unemployed.

The so-defined SD here measures how many non-working population each working person has to support. China's dependency ratio in 1990 was 0.51. This means that each worker supports 0.51 non-worker.

In real life, senior citizens and children have different consumption functions and social activity structures, and the needs for goods and services are different. This difference has a

substantial influence upon economic activity, such as the production, consumption and social welfare system. In order to solve this problem, we now define the old dependency ratio and young dependency ratio.

The old dependency ratio of a country at time t, OD(t) can be defined as

$$OD(t) = O(t) / L(t)$$

Similarly, we can define young dependency ratio as

$$YD(a, t) = Y(t) / L(t)$$

The following table shows the different old

dependency ratios resulting from different population policy assumptions, ranging from N=1.0, 1.5, 2.0 to 2.3.

The computation indicates that the tighter the population policy, the higher the dependency ratio rises in all series. It must also be pointed out that not only the proportion 65 and over in all five series rises, but also the proportion 15-64 decreases, causing a greater dependency burden, with smaller N than with greater N. These results can be seen in tables 2, 3, 4, and 5. We should realize that though the dependency ratio does not vary so much in the next decade, the aged dependents need much more costly services than young dependents. The more rapid the decline in fertility, the faster the population aging. This is because the effect of fertility reduction will immediately cause low proportions of the younger ages and high proportions of the older ages. In addition, when mortality is already at low levels at young and adult ages, it is clear that further reduction can only occur at older ages. Thus the different total fertility rates of the alternative policies will have different effects on the dependency ratio.

Table 6. 100-YEAR PROJECTION OF DEPENDENCY RATIO (1990-2090)

YEAR	N=1.0	N=1.5	N=2.0	N=2.3
1990	0.51	0.51	0.51	0.51
1995	0.45	0.46	0.48	0.48
2000	0.33	0.37	0.42	0.46
2005	0.30	0.37	0.45	0.50
2010	0.31	0.40	0.49	0.53
2015	0.33	0.41	0.48	0.52
2020	0.32	0.39	0.45	0.48
2025	0.34	0.38	0.44	0.48
2030	0.39	0.42	0.48	0.52
2035	0.44	0.47	0.52	0.56
2040	0.59	0.59	0.61	0.63
2045	0.82	0.73	0.70	0.69
2050	1.08	0.86	0.76	0.73
2055	1.24	0.90	0.75	0.72
2060	1.34	0.91	0.76	0.73
2065	1.34	0.92	0.78	0.75
2070	1.34	0.94	0.80	0.77
2075	1.33	0.95	0.81	0.77
2080	1.38	0.99	0.83	0.78
2085	1.44	1.01	0.84	0.79
2090	1.48	1.02	0.84	0.79

According to definitions used by United Nations organizations, a person who is above 60 years old is regarded as an older person. A country or region where 10 percent of the total population is over 60--or 7 percent of the population over 65-- falls under the category of "aging nation."[25] The aging problem and its growth trend are attracting national and world attention. At the end of this century, Chinese population will start to become aged. Sustained low fertility and death rates will lead to an aging society. According to a projection, as the fertility rate declines, the proportion of population 65 years and older will increase and reach about 7.2 percent of the total population by the year 2000.[26] It will have some impact upon the quantity and quality of China's labor forces. This will also increase the burden on society. In addition, medical care, social welfare, and daily services for the old also require money.

The negative impacts of aging population upon production and economic development also include:

1) The increase of the proportion of old population will cause expansion of aggregate consumption expenditures. In China, the demand for old people's clothing, food, entertainment, health care and other services is among the biggest in the world. Even in a relatively fully-employed economy, this will reduce capital accumulation and severely slow the expansion of reproduction.

2) To support increasing numbers of older dependents and to improve the quality of care provided, countries with well-developed social security systems have witnessed rapid growth in real

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[25] United Nations, Aging and Urbanization, New York, 1991, p. 6.

[26] "The Growth trend of Our Aging Population", by the Population Division, the State Statistical Bureau, Guangming Daily, February 24, 1986, (in Chinese).

per capita benefit expenditures during the past several decades.[27] Though the coverage remains much lower in China, both in terms of persons protected and levels of benefit provided, the absolute expenditures for pension increased substantially. The aging population will deepen the existing conflict in national income distribution. In 1985, the Chinese government paid 14.56 billion Yuan[28] to 16,370,000 retired state- and collective -owned business and institution employees, the average pension per worker was 935 Yuan, which were no less than the average wage of the employed workers. The extent of such kind of income distribution may increase as the aged population increases.

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[27] United Nations, The World Aging Situation: Strategies and Policies, New York, 1985, pp. 52-56.

[28] Chinese Currency unit.

5. SOME POLICY IMPLICATIONS

In this section, some policy implications are discussed, and alternative policies are suggested. First, parents' opportunity cost for children plays an important role in the child-bearing decision. The opportunity cost of having children is negatively related to the number of children a couple is willing to have, all other things equal. Secondly, in present China, the majority of aged people are taken care of by their descendants in the family. Under the current population policy, without a well-established social security system, the increase of one-child families will cause frustration and social problems, and will also hinder productivity. The population aging problem associated with tight population control will also bring severe negative social and economic consequences. An efficient non-family-based social security system should be built up in order to protect the elderly. From the discussion below, we shall see that in order to achieve these objectives, the government should promote a more open and liberal market-oriented economy, improve the social welfare system, and promote urbanization. In the current situation, one policy option is to continue to encourage one child per family, while legally allowing each couple to have up to two children.

1. MORE OPEN AND LIBERAL ECONOMIC POLICY

In a closed economy, the growth in population is determined by birth and death rates. In more developed countries, economic factors played an very important role in the determination of birth rates. Since children provide pleasure to their parents, economists tend to analyze family formation within the framework provided by consumption theory. In this view, disposable income,

This suggests that education is an important factor which will affect the fertility rate. It is not unreasonable to predict that as their overall educational level increases, people will more rapidly cooperate with the government's family planning program.

Although it is inappropriate to put a price tag on children in real life, in economic analysis we can treat children as special commodities. If we hold preferences and prices (defined here as the prices of goods and services for children) constant, then an increase of disposable income of parents would increase both the number of children that parents would have and the amount of investment the parents would make in their children, unless some view children as inferior goods. Experience in many developed countries shows that as income increases, the impact on the quality side is larger than on the quantity side. This means that increases in income will make family size increase at a decreasing rate, and the investments in children increase at an increasing rate.[29] In developed countries, and in the upper classes of developing countries, parents tend to make substantial expenditures on the education and other measures which increase the quality of children. Some empirical observations also confirm the expected negative relation between family size and the opportunity cost of children. Housing, food, education, and the opportunity cost of parents' time are obviously cheaper in developing countries, including China, compared to more developed countries, and cheaper in rural than in urban areas. This shows that the substitution effect is larger than the income effect.

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[29] Here we treat children as normal goods. We assume that both the amount of investment parents would like to make on their children(I) and the number of children they want to have (N) are functions of income (i), that is, $I = I(i)$ and $N = N(i)$. The first derivatives of I and N with respect to i are both positive. The second derivative of I with respect to i is positive, but the second derivative of N with respect to i is negative.

individual preference, and the opportunity cost of children, each play an important role in family planning.

The productivity of a person and his or her education level are positively related. As peoples' education level increases, their opportunity of participating productively in economic activity increases, and when this economic opportunity increases, the opportunity cost of their time will also increase. Therefore, we can expect that as the education level increases, the preference for children will decrease. Economic opportunity is of course also affected by economic policy. Despite the fact that it is difficult to get relevant data to make detailed computation and prediction about the relationship between the level of education and fertility, we still can observe that there is a negative relationship between them in China. Table 7 confirms this relationship.

Table 7. Relationship Between Education and Fertility (1984)
[Percentage of woman with more than two children: (1)
Percentage of woman with three children: (2)
Percentage of woman with four children: (3)
Percentage of woman with more than four children: (4)]

(percentage)

Education level	(1)	(2)	(3)	(4)
National Average	17.96	9.64	4.38	3.94
University	1.23	0.82	0.17	0.24
Senior High	3.41	2.50	0.55	0.36
Junior High	9.15	5.69	1.95	1.51
Primary School	26.75	13.74	6.76	6.25
Illiterate	40.19	17.54	9.86	12.79

Source: China Statistical Year Book, 1984, The State Statistical Bureau. P.101, (in Chinese).

One important factor contributing to parents' preference for more children in China, particularly in rural areas, is the current low level of economic activity. The opportunity cost of having more children is so low that some parents feel that to have one more child in the family simply costs another pair of chopsticks at the dinner table. When a nice family planning official was trying to explain the advantages of having only one child to a housewife, she said that looking after children is just like her husband looking after his sheep; he would not mind adding another sheep to his flock. Only when his earning capacity increases will he change his preference for children. This explains why urban families as a whole usually have relatively fewer children. Recently, since the Chinese government adopted a more liberal economic policy in the agricultural sector, farmers in many areas have shifted their attention from land to some other activities. As their income levels increase, and also when housewives become involved in more productive activities, their time becomes more valuable and thus the opportunity cost of time rises. Many of those new farmers find that they no longer have the time to take care of many children. As they get the chance to see more of the outside world, they change their expectation for their children: they want their children to get education and to live better lives. They start to hire baby-sitters and family tutors to help their children. In some interviews conducted by the media, many farmers expressed their new preference for a small family. Also with the more liberal economic policy, those previously poor farmers will not only increase their own standard of living, but also make investment and thus create many employment opportunities. Many newly improved farmers expressed their intention to reinvest their gain, but are fearful of ever-changing policies. To encourage people to voluntarily accept family planning and to cooperate with the government's effort, the essential and ultimate point is to provide

them with more opportunities, and let them realize that there are more valuable things that they can do.

It should be pointed out that the current economic policy conflicts with their population policy. Under the current economic policy, the larger the family size, the larger the labor force, the greater the degree of role specialization by sex and generation, the greater the ability to accumulate tangible resources, and the larger the social network for obtaining capital, labor, technology and market information. The incentive to have more children is reinforced. This also needs to be overcome.

2. IMPROVED SOCIAL WELFARE SYSTEM

Taking care of the old people in the family is an important feature in China and it provides a buffer to the aging problem. This type of family life style has long been appreciated by people in China and by other countries of the world. The Chinese government expects to preserve the family system of social security and encourage young couples to take care of old people, in order to meet the needs of the growing number of aged population. Unfortunately such a system is challenged by the increasing number of families with only one child that disrupt the family support system for the elderly. The government is facing a serious dilemma between the macro-demographic impacts of population policy on total population size and population aging on the one hand, and the micro-demographic effects on the family's ability to support the elderly and its economic capacity on the other hand. As the proportion of one-child families increases, in about 20 to 30 years each couple

will have to take care of over four old people.[30] This will cause frustration and conflict in families and affect family relationships, and reduce old people's welfare and sense of security, and may reduce the productivity of the young people. The negative impact has already become reality and has attracted nationwide concern.[31]

The most important thing for the old is security, but the existing pension system applies only to State- and Collective-owned enterprises and institutions. Farmers and other individual laborers depend on their descendants. Moreover, most of China's old population is in rural areas, and they rely upon their families to assume the major responsibilities for their care. The rationality and the reason for this situation are outside the focus of this paper, but this reality is a challenge to the current population policy and social security system. The overall trend of population aging is: urban areas prior to rural areas, coastal provinces prior to inland provinces, and inland provinces prior to remote provinces. Such a sophisticated trend and differentiation give the government a more sophisticated and challenging issue in building up its security system to face the aging population. To attain both population control and old age support, non-family based options for elderly support need to be explored. Some meaningful linkages between family and government elderly support need to be established. A critical policy issue in China is what the optimal combination of both types of support systems should be.

As an alternative to the above problem, some people suggest that China develop old folks'

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[30] Lei Jeqiong, "Change of urban Family and Old Life", People's Daily, (Overseas edition), August 16, 1991, (in Chinese).

[31] Banister Judith, "China's Population Changes and the Economy," China's Economic Problems, 1991, pp. 241-243.

homes across the nation, a far from sufficient number presently.

My speculation is that instead of monopolizing all the economic activities, the government may give individuals more freedom and space to make their own decisions based on market supply and demand. It is impossible for the central government to put every aspect of the economic and social activities into a perfect plan, nor can the government find sufficient funds to finance all its needs and wants. The law of supply and demand may teach people how to fulfil their needs quickly and efficiently, if the government can stand at the right position to support and adjust the process. Instead of treating services for old people as a non-profit activity which has to be offered by the government, it may not be a bad idea to make it a new business. For example, the government can use the economic incentives to attract business persons to invest in it. Risk-taking should be encouraged and rewarded, regardless of the undertakings.

3. MANAGED URBANIZATION

Given the aging of the Chinese population, from a public policy standpoint what is the preferred pattern of distribution of the elderly between rural and urban areas? Three considerations may lead Chinese policymakers to prefer a younger urban population. First, with the expected productivity advances in rural areas, the labor force required for agricultural production may steadily decline. Second, a relatively young, adaptable work force may be needed in towns and cities to stimulate the development of the industrial and service sectors. Third, the traditional Chinese three-

generation family is more likely to persist in rural areas than in towns and cities,[32] so that older people can be better taken care of by family networks in rural areas.

Urbanization in China is likely to reduce future national birth rates and significantly slow population growth because urban residents are apt to continue to have substantially lower fertility rates than rural residents. And because the migrants to urban areas tend to be young, this will relax the severe urban population aging problem to a certain degree.[33]

Massive urbanization is now under way.[34] This movement can be attributed to China's economic reforms and to a new shift in policy to allow rural-to-urban migration. The key issue is how urbanization should be managed. In my opinion, China should try to avoid the overly rapid growth and high concentration of population in large cities that have produced such serious problems in other developing countries, restrict the expansion of big cities, allow the development of medium-sized cities, and actively promote the growth of towns. Although such a policy might be difficult to implement in most countries, strong and efficient government control in China suggests that it can be made to work reasonably well.

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[32] Zeng Yi, " Changing in Family Structure in China: A Simulation Study," Population and Development Review, no.4, 1986, pp. 675-703.

[33] Zeng Yi and Vaupel James W, "The Impact of Urbanization and Delayed Childbearing on Population Growth and Aging in China," Population and Development Review, No. 3, 1989, p. 425.

[34] Banister Judith, "Urban-Rural Population Projection For China," Staff paper of the Center for International Research, Washington D.C.: US Bureau of the Census, no. 50, 1986.

4. SHORT-TERM POPULATION POLICY

Although the more open and liberal economic policy, improved social welfare system, and managed urbanization are the essental tools to solve the Chinese population problems, they would take a long time to fulfil these objectives. Given the current high population pressure in China, a short-term policy should be implemented.

In 1985, the World Bank published its population projection.[35] The projection of China's popuation indicated that Chinese population will reach the stationary level in about 2020, represented by Net Reproduction Rate (NRR)[36]equal to 1, and fertility, or Gross Reproduction Rate, equal to 2.1. This result almost coincides with the 100-year projection with N=2.0, reported earlier. Combining the World Bank projection and the results of the 100-year projection discussed in chapter 4, and considering factors such as total labor force and dependency ratio and their impact upon economic development, we may conclude that the optimal control target of the crucial variable N should be set between 1.5 and 2.0, respectively. We can assume another approach, that is, to set our control range as $1.0<N<1.5$. These three assumptions are illustrated in figure 10.[37] As we discussed in Chapter 4 and Chapter 5, this approach will meet challenge in practice in the short-run and face

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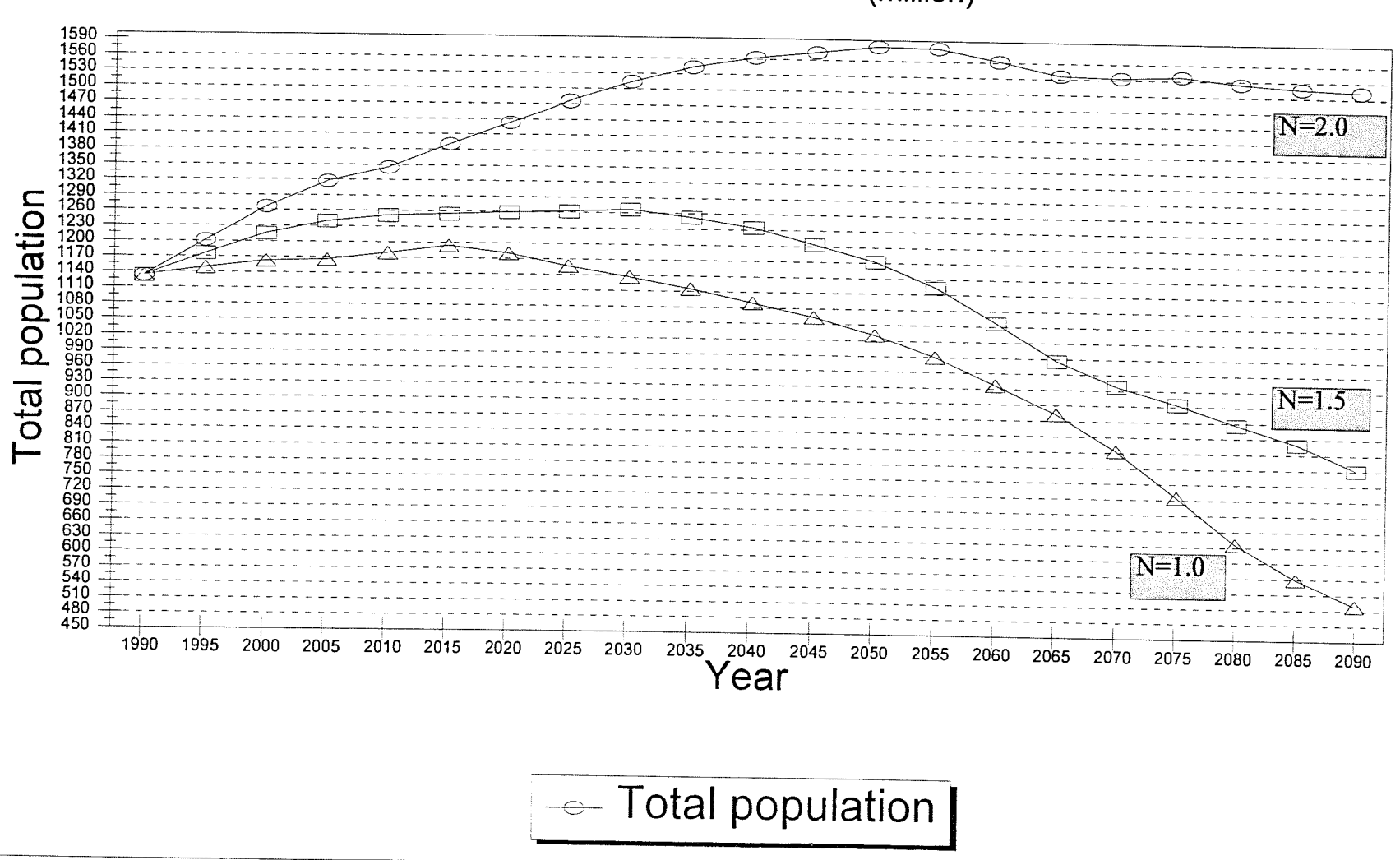
[35] World Population Projections, 1985. "Short- and Long-term Estimates by Age and Sex With Related Demographic Statistics," From the data file of the World Bank. The Johns Hopkins University Press, Baltimore and London, pp. 272-273.

[36] The NRR measures the extent to which women reproduce themselves under given fertility and mortility conditions. A NRR=1 means thath women simply reproduce themselves. In other words, each women during her reproductive years produces one female child. A stationary population is represented by NRR=1. In this paper, the N can be seen as gross reproduction rate (GRR). The assumption of N=GRR=1 can be translated as equal to NRR=0.5.

[37] Figure 10 is constructed with data from table 3, 4, and 5.

Figure 10 POPULATION CONTROL TARGET



problems in reaching sustained development in the long-run, therefore it is not a realistic policy goal.

In my opinion, the government should legally allow each couple to have two and only two children. Those who decide to have one or no children should be encouraged with high compensation, because with the given contribution they make to society, they take a smaller share from society. In turn, society should let the parents share the external welfare that the parents previously contributed to society. The opposite is also true. Since in China, many public services and social security benefits are available to the public free or at low charge, those who choose to have more than two children will take a larger share at the expense of others' relatively low share, and they should be charged with substantially high economic penalty.[38] In this way, the society can shift the external cost of the additional child to the internal cost of parents who choose to have more than two children. As we discussed in the first section of this paper, when the levels of education and standard of living increase, the opportunity cost for parents to have children will be higher and many may not want to have two children.

In sum, it is my belief that given the current population pressure and the aging problem, people's overall welfare should be taken into account. From my standpoint, therefore population control is very important and necessary.

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[38] It is not unreasonable to assume that after a couple have the second child, the marginal utility of the third child is lower than the first and even lower than the second, and the elasticity of demand should be also fairly high. Thus the economic penalty should be high enough to show the government's principle and policy, and to compensate society.

6. SUMMARY AND CONCLUSION

The introduction of the one-child-per-family policy in China in 1979 gave rise to a good deal of controversy. Although the net natural growth of population has been declining, and the achievements are appreciated, there have been frequent violations of human rights and associated human misery. These violations are hurting China's international image.

The negative impact of rapid population growth is clear. Without population control, China will continue to remain at the subsistence level of income. However, a sharp decline in total population, which is the end result of a one-child policy, will also hamper China's economic development. The disadvantages of the one-child-per-couple policy can be summarized as follows:

1) With the one-child policy, China may face the danger of shortage of labor force when China is seeking sustained economic development. If the one-child policy can be successfully implemented, China's total population in 2090 will be less than 520 million, with 55 percent old dependents. This will put a significant strain on the national economy.

2) The current policy will accelerate the process of aging population. A high ratio will put pressure on society. Even more, if old people mainly contribute to the high dependency ratio, it will cause some economic pressure and social conflict. Until China has built up a more complete social security system, most people still need to have more than one child to assure security.

3) The strict enforcement of the one-child policy will cause human misery. The reappearance of female infanticide is the direct result of the new policy. Without a policy change, this trend will cause sex ratio to lose balance.

In sum, the most uncertain consequence of Chinese population policy lies in the political, economic and social sphere. If the social security system is not well instituted, or if the economic incentive fails to materialize, serious disillusionment could pervade Chinese society, complicating any successful struggles or economic crises that may occur.

To solve the Chinese population problem, we need to take into account both economic development target and human rights, which will also affect the aggregate social welfare. In order to promote voluntary, non-abortion family planning, several steps should be taken:

1) Increase educational level of the whole population. Our table 5 indicates that there is a clear correlation between education and fertility, and the number of children per couple is negatively related to the parents' education level. This suggests that education is an important factor in the child-bearing decision, since education can affect parents' opportunity cost for children.

2) Increase productivity and build a solid material base. We showed that one important factor contributing to parents' preference in China, particularly in rural areas, is the relatively low level of economic activity. The opportunity cost of having children is negatively related to the number of children parents are willing to have. As people become more productive, and their economic opportunities increase, their opportunity cost to have children will increase, and they will voluntarily accept family planning.

3) Improve social welfare and security system, and make efficient use of these public facilities. At present in China the majority of old people are taken care of by their family members. A well-developed non-family social security system will assure security through society, rather than mainly through the family security system, and will thus reduce the need for more children, thereby

reducing the problem of female infanticide.

4) As we discussed in chapter 5, to relieve the current and potential urban aging population pressure, the government should encourage rural-to-urban migration with government support and economic incentive, and promote urbanization, especially in the medium-sized cities and towns.

5) In order to solve the population problem ultimately and to fulfil the above steps, the government should introduce and assure a more open and liberal economic policy, and promote a market-oriented economy. As economic development occurs, demographic transition will occur. One important factor affecting parents' preference for children is the opportunity cost of their time. Economic policy will indirectly induce parents to voluntarily have fewer children.

As a temporary compromise, the short-term population policy should allow the maximum of two children, while encouraging the one-child family. In order to keep population from growing fast, the government should promote a voluntary family planning program, compensate one-child families, and put economic penalty on parents who choose to have more than two children. Overall, a smooth and slow population growth is preferable to a sharp decline.

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