The One-Child Policy's Socio-Demographic Impact: Current Trends and Alternative Policy Projections

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The One-Child Policy’s Socio-Demographic Impact:
Current Trends and Alternative Policy Projections

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WH-299-301

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Table of Contents

I. Introduction

II. Prior Literature

III. Overview: As-Is Forecasts for China’s Population
   (a) Declining Fertility Rates
      i. Table 1: Total Fertility Rates Under Different Policy Periods in China
      ii. Figure 1: Decline in China’s TFR, 1990–2050
   (b) Huge Population Base: Population Yet to Peak
      i. Figure 2: China’s Total Midyear Population, 1950–2050
      ii. Figure 3: Changing Life Expectancy and Total Fertility Rate in China

IV. Problems Implied by Status Quo Forecasts
   (a) Rapidly Aging Population, Shrinking Youth Cohorts
      i. Table 2: China’s Population by Age Groups, 1950–2050
      ii. Table 3: Population Increase or Decline in China by Age Groups, 1950–2050
      iii. Figure 4: Projected Changes in China’s Age Distribution, 1950–2050
   (b) Changing Shape of China’s Population Pyramids
      i. Figure 5: Selected Population Pyramids for China: 1990, 2000, 2025 & 2050

V. Further Negative Implications of Status-Quo Forecasts
   (a) Total Dependency Ratio
      i. Figure 6: Total Dependency Ratios in China Under Different Variants, 1990-2050
      ii. Table 4: Total Dependency Ratio, UN Medium Variant (2002 Revision)
   (b) Elderly Dependency Ratio
i. Table 5: Dependency Ratios Under Different Policy Periods in China

VI. The Expected Problem with China’s Pension System

i. Figure 7: Ratio of Workers to Pensioners in China, 1975–1995

ii. Table 6: Number of Retirees and Pension Sum Projections, 2000-2030

(a) The Inadequacies of the Current Old Age Pension System

i. Figure 8: Ratio of Workers to Pensioners in China, 1975–1995

(b) Old Age Security Reform in China

(c) Sustainability of the Reformed System

VII. Demographic Projections: Overview and Methodology

(a) Overview of Spectrum Policy Model

(b) Methodology

VIII. Demographic Projections: Key Assumptions and Inputs

(a) Base Year Assumptions

(b) Fertility Rate Assumptions

i. TFR: One-Child Policy Projection

ii. TFR: Two-Child Policy Projection

iii. Mortality Rate Assumptions

(c) Table 7: Demographic Inputs and Assumptions

IX. Demographic Projections: Results From Adjusted Inputs and Assumptions

(a) Population Pyramids

i. Figure 9: Projected Age-Sex Pyramids Under Different Policy Scenarios, 1990 & 2050

(1) One-Child Policy Scenario (Medium Variant)

(2) Two-Child Policy Scenario (Medium Variant)

ii. Figure 10: Projections of Productive (15–64) and Dependent (65+) Aged Populations in China Under Different Policy Scenarios, 1990–2050

(1) Working Population, age 15-64
(2) Elderly Dependent Population, age 65+

(b) Changing Dependency Ratios

i. Figure 11: Elderly Dependency Ratios in China, 1990-2050: Current One-Child Policy vs. Projected Under Adjusted Assumptions

ii. Table 8: Elderly Dependency Ratios in China, Current Projections (“As-Is”) and Projections Under New Assumptions (“Adjusted”)

X. Policy Tradeoffs: Balance in Age Structure vs. Overall Population Growth

(a) Total Population Growth

i. Figure 12: Total Population Growth Under Different Policy Scenarios, 1990–2050

   (1) Under One-Child Policy Scenario, (Medium Variant)

   (2) Under Two-Child Policy Scenario, (Medium Variant)

(b) Costs and Benefits of Two-Child Policy

i. Table 9: Summary of Costs and Benefits of Implementing a “Two-Child Policy”

XI. Implications and Conclusions

XII. Further Issues and Research Questions

XIII. References and Sources Consulted
I. Introduction

Over the past three and a half decades, China’s demographic transition from high to low fertility and mortality rates has been more dramatic than that of any other nation in history. Mainly as a result of both China’s “later-longer-fewer” family planning campaign (1971–1978) and the current “one-child policy” (1979–present), fertility levels have dropped from about six children per woman to the current rate of between one to two children per woman.\(^1\) As long as current family planning policies persist, fertility rates are projected to remain near – or possibly even sink below – present levels, which facilitate the central government’s current demographic objective of keeping China’s population under 1.6 billion by the year 2050, with zero population growth going forward.\(^2\)

The original intent of the Chinese government in phasing in family planning policy was two-fold: to face the challenge of feeding its rapidly growing population and to minimize the imbalance between the nation’s economic development and population growth by restricting fertility rates. In retrospect, the food challenge has been met with great success. Several studies have shown that China has enough arable land and water to feed its projected population of over 1.45 billion in 2025 – even at currently available levels of agricultural technology.\(^3\) Whether the one-child policy will turn out to be as much of a success in promoting the government’s development goals and the Chinese people’s living standards, however, is less obvious.

Although the one-child policy has consistently met the government’s official population targets, it has also led to growing imbalances within the demographic age composition and is expected to result in further dramatic increases in China’s elderly population over the next half century. As a result, single children are finding it increasingly burdensome to support

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\(^1\) US Census Bureau International Data Base estimates.

\(^2\) Statement made by Zhang Weiqing, minister in charge of the State Family Planning Commission.

their parents, and the task of supporting tomorrow’s elderly will fall on a shrinking population of working people. Moreover, the Chinese government does not have the necessary funds or social security system in place to support the projected growth in China’s aged population. The significance of these issues have brought to question whether policy changes should be adopted to China’s current family planning measures; one proposed solution is the widespread adoption of a “two-child policy,” similar to the one implemented by Vietnam in 1993. Since an examination of the social desirability of coercive family planning policy is outside the scope of this study, I will accept the government’s 2050 population goals as given and use it as the basis for my analysis of a “two-child policy.”

The central question that I would like to address is the scope of how different the societal ratios would be in China under alternative family planning policy. In part through my own population projections and in part through secondary research, this paper investigates: (1) what China’s population will look like in fifty years if current trends persist under the one-child policy, (2) how different the demographic age structure would be under a two-child policy assumption, and (3) what the costs and benefits of these policy tradeoffs are for the Chinese government. In the trends analysis, two projection scenarios with three variants of fertility are made with the Spectrum Policy Modeling System. Following an analysis of these projections, this paper concludes with a discussion of the implications of population aging on China’s social security system as well as its effects on China’s socio-economic development.

II. Prior Literature

As recent scholars have noted, issues related to population control measures in China – namely the one-child policy, its evolution and impact – have generally been analyzed from three main perspectives: demographic, economic, and ideological (Greenhalgh, 2001; Shaw, 2002). The first two perspectives, usually involving some discussion of Malthusian theory,
focus on sustainable development and the relationship between “appropriate” population size and economic growth. While the Chinese government’s stance is in favor of restricting population size in order to promote economic growth, some scholars refute the view that increases in population necessarily lead to economic degradation, and vice versa. Non-Chinese studies approached from an ideological perspective have generally considered the appropriate role of the Chinese government in implementing population control measures vis-à-vis arguments for reproductive freedom and gender equality (Croll, 1984; Saith, 1984). From a policy perspective, most of the studies conducted in the 1980s–1990s have documented the measures adopted to enforce the one-child policy and attempted to assess compliance rates in different regions of China (Banister 1987; Greenhalgh 1986; Tien 1991).

Prior literature on the demographic impact of China’s family planning measures goes back to the early 1980s (Gui, 1983; Xi, 1984; Goldstein, 1986; Banister, 1988; Tu et al, 1988). However, it is only recently that scholars have turned more attention to studying the implications of China’s aging demographic structure. There are plenty of reasons for the growing interest – the profit motive, the debate about the provision of social services and health care, the involvement of elderly people in the economy, and, most importantly, the aging of the Chinese population itself. Up until recently, however, most of the research published on age demographics have focused on highlighting the detrimental effects of the one-child policy – and some have largely done so from ideologically biased perspectives. For instance, “The Aging of China’s Population” (Banister, 1988) was published in a journal dedicated to Problems of Communism, and the study, “Consequences of Alternative Population Policies on Aging in Mainland China” (Tu et al, 1988), was conducted by Taiwanese researchers during a period in which the island nation was experiencing strained relations with China regarding territorial issues as well as disagreements over China’s right to enforce the one-child policy on Taiwanese-Mainland Chinese couples.
Ideological issues aside, surprisingly few studies have explored whether alternative family planning measures, such as a “two-child policy,” might be able to mitigate the problems projected to emerge in China’s population. The most notable study on this topic, “An Alternative to the One-Child Policy in China,” was published in 1985 by two leading researchers in the field, John Bongaarts and Susan Greenhalgh. In this study, the authors assess how much the total population would change under a two-child policy alternative, whose key elements are delayed childbearing and increased spacing between births. Bongaarts and Greenhalgh conclude that a two-child policy, when accompanied by delayed childbearing, could be just as effective as a one-child policy in achieving China’s 2000 population goals. The study does not, however, address how changing fertility patterns would affect the age-sex distribution of China’s total population.

Fubin Sun’s 1998 publication, “Aging of the Population in China: Trends and Implications,” projects China’s population under nine different fertility variants and then analyzes the respective effects on China’s age structure. However, this study does not attempt to assess the costs by measuring each alternative policy projection’s contribution to total population growth. Indeed, no subsequent research has sought to quantify the tradeoffs between curbing total population growth (under a one-child policy) and allowing for a more balanced age structure to emerge (under a two-child policy). In my study, however, I attempt to address the impact of a two-child policy on both age structure and total population, with an emphasis on age-sex pyramids and dependency ratios. Before I discuss the results of my population projections, however, I will start with an analysis of China’s current population forecasts under the one-child policy.

III. Overview: As-Is Forecasts for China’s Population

a. Declining Fertility Rates
Due to its strong efforts at population control over the past two and a half decades, China has experienced an estimated 338 million fewer births in the past 30 years and saved upwards of 7,000 billion RMB (US$843 billion) in state funds that otherwise would have been spent on these children.\textsuperscript{4} The dramatic decrease in the number of births due to China’s policy initiatives is clearly reflected by China’s falling Total Fertility Rate (TFR). In the 50s and 60s Chinese women, on average, had between 5.6 and 6.3 children.\textsuperscript{5} Since the implementation of China’s various population control measures, however, fertility rates dropped sharply from 1970–1980.

Table 1: Total Fertility Rates Under Different Policy Periods in China

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>“Later-Longer-Fewer” Policy Period</td>
</tr>
<tr>
<td>1971</td>
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<tr>
<td>1972</td>
</tr>
<tr>
<td>1973</td>
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<td>1985</td>
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<tr>
<td>1986</td>
</tr>
<tr>
<td>2000</td>
</tr>
<tr>
<td>2001</td>
</tr>
</tbody>
</table>

Note: 1971-82 TFRs are adjusted to correct for effect of lunar calendar and statistical understatement in other years.

\textsuperscript{4} Ding, Yimin. \textit{China’s One-Child Policy Enters New Phase}, 15 February 2001 (Beijing, China).

\textsuperscript{5} United Nations Populations Division: World Population Prospects database.
Table 1 illustrates the significant drop in TFR during both the “later-longer-fewer” and the one-child policy periods. The downward trend in fertility rates is most dramatic during the “later-longer-fewer” period (1971-1978), in which China’s TFR declined from 5.27 children per woman to 2.78 children per woman. The decline in fertility rate continued – though not as dramatically – from the 1979 onwards under the one-child policy, and China’s TFR went from 2.66 children per woman to slightly over two children per woman in 1990.

Recent statistics from the 2000 Census support Chinese officials’ statements that the country’s population growth has continued its steady decline. In March 2001 – several months after the publication of the country’s first nationwide census in a decade – Zhu Zhiwin, Director-General of China’s National Bureau of Statistics (NBS), announced that the annual growth in population was 1.07%, reflecting a 0.4% decrease from the growth rate of the 1980s. Currently, the UN Population Division estimates a TFR in China of only 1.71 children per woman. Figure 1 illustrates the decline in fertility rates since the time of China’s last census in 1990, as well as projects China’s TFR out to an expected steady rate of 1.70 children per woman by the decade 2040-2050.

Figure 1: Decline in China’s TFR, 1990-2050

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China’s TFR per Woman, 1990-2050

Source: Chart created from data in Table 029, China, “Age-Specific Fertility Rates and Selected Derived Measures,” US Census Bureau International Data Base, 2002.

Assuming that official UN and National Bureau of Statistics population projections accurately estimate Chinese population growth, at a constant TFR of 1.70 China’s fertility rates would be commensurate with that experienced by most of the world’s developed countries. According to The CIA World Factbook, the United Kingdom’s TFR was 1.66 children per woman in 2003, while France and the US had TFRs that were actually higher than China’s – at 1.85 and 2.07, respectively. Although Figure 1 projects an increasing TFR for China in the near future – peaking at 1.85 in 2016 before falling to a steady level of 1.70 by 2040 – this would still place China within the benchmark “replacement level fertility rate” of between 2.10 and 2.20 children per woman. Replacement level fertility, which has been one of the main goals of the government, is the rate at which a population reaches zero population growth.

b. Huge Population Base: Population Yet to Peak

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8 Replacement level fertility implies a TFR between 2.1 and 2.2 children per woman.
Although official TFR projections for China have been within range of replacement level fertility for the past 10 years, as Figure 2 shows, the implications are still staggering; China’s population was approximately 1.26 billion as of the 2000 Census; this figure represents about 21 per cent of the total world population at the time.\(^9\) Despite the government’s effective efforts at decreasing fertility rates, relatively conservative estimates reveal that China is still adding between 8-13 million people each year, driven mainly by the country’s large population base.

**Figure 2: China’s Total Midyear Population, 1950-2050**

![Chart showing China's total midyear population from 1950 to 2050.](chart.png)

**Source:** Chart created from data in Table 001, China, “Total Midyear Population,” *US Census Bureau International Data Base*, 2002.

In the 2000 Census, China’s *National Bureau of Statistics* (NBS) reported that Mainland China’s population had grown by 132.2 million in the period between 1990-2000.\(^{10}\) To put it in perspective, this 11.7% increase exceeds the entire population of

\(^9\) The total midyear population for the world in 2000 was 6,079,006,982 people (US Census Bureau International Data Base estimate, 17 July 2003). China’s total midyear population in 2000 of 1,262,474,301 puts China’s population at 21% of the world total at the turn of the century.

Japan (127 million in 2000). While 2000 Census data met the Chinese government’s official goal of staying below 1.3 billion for 2000, statistics reveal that even with consistently low, near-replacement level fertility rates China’s population has yet to peak. This is mainly because China’s future population growth is still being driven by its past growth.

Looking forward to the future of China’s population growth, the US Census Bureau forecasted that the population would increase to over 1.46 billion in 2033 before gradually declining to 1.42 billion in 2050 (see Figure 2). If this is true, in the next three decades China’s population will increase by 173 million people – roughly 60% of the total US population – before gradually declining in 2033–2050 by 43 million people. As many observers have noted, to meet the additional demands of the population is one of the core problems that China’s government must face in the coming decades.

Given the factors driving China’s changing demographic picture, there is not much that Chinese officials can do about the inevitable population growth in the near future. Family planning policies have already driven fertility rates to below replacement levels in urban areas. The increase in China’s population over the next three decades will be caused not by high fertility levels, but by the "population momentum" of China’s young age structure. This is due to population trends from the 1950s and 1960s, when mortality rates declined significantly, while fertility rates remained high. As Figure 3 indicates, life expectancy increased by about 20 years in the period 1950-1970, while TFR remained relatively constant, between 5.94–6.10

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children per woman. It was not until the 1970s and 1980s that fertility rates began to decline significantly under family planning policy.

**Figure 3: Changing Life Expectancy and Total Fertility Rates in China, 1950-1980**

<table>
<thead>
<tr>
<th>Year</th>
<th>TFR</th>
<th>LE (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950 - 1955</td>
<td>6.10</td>
<td>40.8</td>
</tr>
<tr>
<td>1955 - 1960</td>
<td>5.42</td>
<td>44.6</td>
</tr>
<tr>
<td>1960 - 1965</td>
<td>5.52</td>
<td>49.5</td>
</tr>
<tr>
<td>1965 - 1970</td>
<td>5.94</td>
<td>59.6</td>
</tr>
<tr>
<td>1970 - 1975</td>
<td>4.75</td>
<td>63.2</td>
</tr>
<tr>
<td>1975 - 1980</td>
<td>2.89</td>
<td>65.3</td>
</tr>
</tbody>
</table>

**Note:** Life expectancy data for China do not include Hong Kong and Macao Special Administrative Regions.


As a result of over two decades of increasing life expectancies without a corresponding drop in fertility rates, China now has a significant population of adults of reproductive age, and the
total number of adults of childbearing age is only expected to increase over the next ten years. This is expected to continue fueling China’s population growth, despite the government’s efforts to lower fertility rates. Furthermore, once we take into consideration both the expected short-term increase in TFR, and the distinct possibility that 2000 Census data may have underestimated China’s population base and fertility rates in rural areas, we see that China still has a ways to go before it can achieve the central government’s goal of moving from low growth to zero growth.

IV. Problems Implied by Status Quo Forecasts

Aside from finding ways to enforce low fertility rates in the face of continued population growth, of as much concern to Chinese policy makers is the expectation that the coming decades will bring immense structural change to China’s population. Indeed, China’s future population growth, while significant, masks other worrisome trends that the government will have to face – namely the growing imbalances within the age composition. While some discrepancies exist between statistics published by the US Census Bureau (International Data Base) and the UN Population Division (World Population Prospects), an analysis of both data reveal the same overall trends: (1) the 0–4 year old and 5–19 year old cohorts will steadily decline over the next 50 years; (2) the 20–49 year old cohort will grow – driving up China’s additional population growth as individuals within this category start families of their own – before it, too, declines from 2025 onwards; and (3) the population age 50 and up will grow by a disproportionate percentage of the total population growth. In the following sections, we will analyze each of these trends as well as explore their social implications for Chinese society.

a. Rapidly Aging Population, Shrinking Youth Cohorts
China will experience a dramatic trend in population aging over the next 50 years.

According to UN population projections, China will have around 1.42 billion people by the year 2050, and only 22.5% of this total population will be age 20 and under.

*Table 2* summarizes the UN Population Division’s estimates of China’s changing age distribution.

**Table 2: China’s Population by Age Groups, 1950-2050**

<table>
<thead>
<tr>
<th>United Nations Population Projections, 2001 Revision (Medium Variant)</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>% change</td>
</tr>
<tr>
<td><strong>0 – 4</strong></td>
</tr>
<tr>
<td>% change</td>
</tr>
<tr>
<td><strong>5 – 19</strong></td>
</tr>
<tr>
<td>% change</td>
</tr>
<tr>
<td><strong>20 – 49</strong></td>
</tr>
<tr>
<td>% change</td>
</tr>
<tr>
<td><strong>50 +</strong></td>
</tr>
<tr>
<td>% change</td>
</tr>
</tbody>
</table>


Following a near-term surge in the population of 20–49 year olds, this group is also projected to decline after 2010. While this increase in the number of people coming of reproductive age should drive up the number of children born in the next 10 years, it is not nearly enough to offset the overall aging of the population. This leaves us
with the most dramatic change in the structure of China’s age distribution – the massive increase in the elderly population.

Table 3: Population Increase or Decline in China by Age Groups, 1950-2050

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.66 bn</td>
<td>0.14 bn</td>
<td>0.09 bn</td>
<td>-0.03 bn</td>
<td>0.2 bn</td>
</tr>
<tr>
<td>0 – 4</td>
<td>0.02 bn</td>
<td>-0.01 bn</td>
<td>-0.01 bn</td>
<td>-0.01 bn</td>
<td>-0.02 bn</td>
</tr>
<tr>
<td>5 - 19</td>
<td>0.15 bn</td>
<td>-0.03 bn</td>
<td>-0.02 bn</td>
<td>-0.03 bn</td>
<td>-0.08 bn</td>
</tr>
<tr>
<td>20 - 49</td>
<td>0.36 bn</td>
<td>0.07 bn</td>
<td>-0.07 bn</td>
<td>-0.06 bn</td>
<td>-0.06 bn</td>
</tr>
<tr>
<td>50+</td>
<td>0.12 bn</td>
<td>0.12 bn</td>
<td>0.17 bn</td>
<td>0.09 bn</td>
<td>0.38 bn</td>
</tr>
</tbody>
</table>


As Table 3 indicates, the number of people aged 50+ – already estimated to increase by 120 million from 1995–2010 – is projected to grow by an additional 170 million (2010–2025) and 90 million (2025–2050). The result is that by 2050, China will have almost twice as many people above the age of 50 than below the age of 20. In fact, the total number of people below the age of 50 is expected to decline by more than 160 million. This means that China’s population growth will be disproportionately driven by the growth of the age 50+ cohort (Figure 4).
a. Changing Shape of China’s Population Pyramids

A useful tool for analyzing changes in China’s demographic age structure over time is the population pyramid. These graphs are divided into two sections (male and female), and as we move up from the bottom of the pyramid each step represents an older age group. The US Census Bureau maintains a website\textsuperscript{14} with animated population pyramids for most countries. From the changing shape of China’s pyramids (Figure 5), we can see how population changes are projected to unfold in China over time.

Figure 5: Selected Population Pyramids for China: 1990, 2000, 2025 and 2050

Source: U.S. Census Bureau, International Database.
Beginning with the shape of the 1990 population pyramid – specifically at how the base of the pyramid flares out before it tucks in near the bottom – we can infer that there are fewer children being born in China. Although the US Census Bureau’s website does not provide population pyramids for China before 1990, if we were to construct one for China in 1950, for example, its shape would have a much broader base that reflects the high fertility rates of the time, as well as a narrow tip due to

15 “There is a lesson here for other third world countries. That sudden tuck in the bottom of the Chinese pyramid, compared with the flaring pyramid [of other developing countries], means fewer children to support now, an eventual reduction in the huge number of unemployed, fewer mothers having babies in the next generation, and the hope for stopping runaway population growth. The comparison with [most other developing countries’] plights is a dramatic argument for population programs.” (UN, 1994)
China’s higher mortality rates and lower life expectancies during this earlier period. (See Figure 3 for life expectancies during the 1950s). In general, statistics show that less developed nations exhibit population pyramids with broad bases because the youngest age groups would account for larger percentages of the total population, while the older age groups would be proportionately smaller due to shorter life expectancies. On the other hand, the population pyramids of more developed countries would have a more rectangular shape due to lower fertility rates and higher life expectancies.

China's population pyramids in 1990, 2000, 2025* and 2050* (projected*) provide a good example of how family planning policies and economic development have changed the country's demographic structure and will continue to effect changes into the future. Projections for China's age-sex structure in 2050 are dramatically different from those in 1990, with a much greater proportion of the population concentrated in the older age ranges. We can visualize the aging of China’s population by following the “bulge” of China’s “baby-boom” generation from the 1950s and 1960s as it progresses upwards through the age brackets of China’s population pyramid. The aging of China’s population is demonstrated not only by the rapid increase in the proportion 65 and older, but also by the increase in the proportion of those aged 75+ and 85+ relative to the total population of elderly people 65 and over. US Census Bureau statistics for China indicate that the two oldest age cohorts (aged 75+ and 85+) will continue to increase relative to the total elderly population for the next decade or so. Two decades from now, the “baby boom” generations from the 1950s and 1960s are expected to temporarily increase the proportion of the elderly population aged 65–74, before the 75+ and 85+ age cohorts again dominate as the largest components of the aged population from 2035 on.
At the national level, China’s process of population aging is due primarily to long-term declines in the fertility rate and improvements in survival at all ages – especially at older ages in recent decades. Of the three components of population change (i.e., fertility, mortality and migration), fertility and mortality have driven the changing age distribution of the Chinese population over the last century.

b. Further Negative Implications of Status-Quo Forecasts

a. Total Dependency Ratio

The Total Dependency Ratio provides an indication of the proportionate size of economically dependent age groups compared to the population of people in their productive years. In cases where more detailed data are lacking, the Total Dependency Ratio is often used as an indicator of the economic burden (from both the young and the elderly) that the productive portion of a population must support. This is expressed by the following formula:

\[
\text{Total Dependency Ratio} = \frac{\text{Youth Population} + \text{Elderly Population}}{\text{Working Population}} \times 100
\]

Where:

- “Youth Population” represents persons, aged 0-14
- “Elderly Population” represents persons, aged 65+
- “Working Population” represents persons, aged 15-64

As China’s population ages and retires, the growing costs of supporting the youth and the elderly will fall on an increasingly smaller working population. This trend is captured by China’s Total Dependency Ratio, which is expected to increase
significantly over the next five decades. **Figure 6,** created from UN Population Division data, shows China’s Total Dependency Ratio under four variants. No matter what TFR assumption is made, all variants yield the same upward trend in China’s Total Dependency Ratio. In our analysis, we will focus on the medium variant, which projects China’s fertility to remain at its current “below-replacement” level during the entire projection period to 2050.

**Figure 6: Total Dependency Ratios in China Under Different Variants, 1990-2050**

![Total Dependency Ratio in China, 1990-2050](chart)


Looking at the figures comprising China’s Total Dependency Ratio under the medium variant (**Table 4**), we find that the ratio is actually decreasing in the current period from 1990–2010. This trend is consistent with our expectations of China’s near-term population growth, which will be driven by the “population momentum” of China’s current generation of individuals who are coming into reproductive (and working) age. Although the near-term increase in the number of births will drive up the Youth
Dependency component of the Total Dependency Ratio, the number of individuals entering into working age offsets the increase in the dependent population until approximately 2015.

Table 4: Total Dependency Ratio, UN Medium Variant (2002 Revision)

<table>
<thead>
<tr>
<th>Year</th>
<th>Medium Variant</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>1995</td>
<td>48</td>
<td>-4%</td>
</tr>
<tr>
<td>2000</td>
<td>46</td>
<td>-4%</td>
</tr>
<tr>
<td>2005</td>
<td>42</td>
<td>-9%</td>
</tr>
<tr>
<td>2010</td>
<td>40</td>
<td>-5%</td>
</tr>
<tr>
<td>2015</td>
<td>40</td>
<td>0%</td>
</tr>
<tr>
<td>2020</td>
<td>44</td>
<td>10%</td>
</tr>
<tr>
<td>2025</td>
<td>46</td>
<td>5%</td>
</tr>
<tr>
<td>2030</td>
<td>50</td>
<td>9%</td>
</tr>
<tr>
<td>2035</td>
<td>56</td>
<td>12%</td>
</tr>
<tr>
<td>2040</td>
<td>61</td>
<td>9%</td>
</tr>
<tr>
<td>2045</td>
<td>63</td>
<td>3%</td>
</tr>
<tr>
<td>2050</td>
<td>64</td>
<td>2%</td>
</tr>
<tr>
<td>Total Change</td>
<td>14</td>
<td>28%</td>
</tr>
</tbody>
</table>

From 2015 onwards, however, China will be challenged with the growing demands of the dependent population as increasing numbers of individuals enter into the age 65+ cohort. By 2050, China is projected to witness a 28% growth in the Total Dependency Ratio, which is especially significant considering China’s large population base. Given that China’s social security and old-age pension systems are currently on the verge of bankruptcy and in great need of reform, it is of interest to understand how much of the projected 28% increase in the Total Dependency Ratio will be driven by an increase in the elderly population. This should give us an indication of the magnitude of the problem that the Chinese government will have to face in the upcoming decades in order to support the larger financial burdens of the old. Hence, a more informative approach is to disaggregate the Total Dependency Ratio into its Youth and Elderly components.

b. Elderly Dependency Ratio

The Elderly Dependency Ratio (EDR) provides an indication of the proportion of those of retirement age to those of working age. Although not everyone over the age of 65 is necessarily a dependent (and not everyone between age 15 and 64 is necessarily a productive member of Chinese society), EDR still helps us understand how dependency trends in China are changing over time. EDR is expressed by the following formula:

\[
\text{Elderly Dependency Ratio} = \frac{\text{Population 65+}}{\text{Population 15-64}} \times 100
\]

Examining China’s changing age structure under the one-child policy reveals that the components of the Total Dependency Ratio have shifted significantly over time. As Table 5 indicates, the past two decades have been characterized by consistent
increases in the aged dependency ratio and an overall decrease in the youth dependency ratio.

Table 5: Dependency Ratios Under Different Policy Periods in China

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>79</td>
<td>71</td>
<td>8</td>
</tr>
<tr>
<td>1970</td>
<td>79</td>
<td>71</td>
<td>8</td>
</tr>
<tr>
<td>1975</td>
<td>78</td>
<td>70</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>One-Child Policy Period (1979 – Present)</th>
<th>Total</th>
<th>Youth</th>
<th>Elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>67</td>
<td>59</td>
<td>8</td>
</tr>
<tr>
<td>1985</td>
<td>55</td>
<td>47</td>
<td>8</td>
</tr>
<tr>
<td>1990</td>
<td>50</td>
<td>41</td>
<td>8</td>
</tr>
<tr>
<td>1995</td>
<td>48</td>
<td>39</td>
<td>9</td>
</tr>
<tr>
<td>2000</td>
<td>46</td>
<td>36</td>
<td>10</td>
</tr>
<tr>
<td>2005*</td>
<td>42</td>
<td>31</td>
<td>11</td>
</tr>
<tr>
<td>2010*</td>
<td>40</td>
<td>28</td>
<td>11</td>
</tr>
<tr>
<td>2015*</td>
<td>40</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>2020*</td>
<td>44</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>2025*</td>
<td>46</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>2030*</td>
<td>50</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>2035*</td>
<td>56</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>2040*</td>
<td>61</td>
<td>26</td>
<td>35</td>
</tr>
<tr>
<td>2045*</td>
<td>63</td>
<td>26</td>
<td>36</td>
</tr>
<tr>
<td>2050*</td>
<td>64</td>
<td>26</td>
<td>37</td>
</tr>
</tbody>
</table>
Driven by the rapidly aging population, China’s Elderly Dependency Ratio is projected to increase dramatically in the upcoming decades. UN Population Division projections estimate that the aged dependency ratio will have more than tripled 2000 statistics by the year 2050. Although the Total Dependency Ratio does not increase nearly as much as the Elderly Dependency Ratio (due to the corresponding 27.8% overall decrease in the Youth Dependency Ratio), there is a significant economic impact in the changing proportions of youth and aged dependency ratios. One reason is that public sector expenditures on elderly people are substantially higher per person than on the young due largely to the increased health care needs and costs of the aged population. Furthermore, the anticipated change in the EDR illustrates the increasing impact of the elderly on the pension system and other social security programs specific to the older population in China.

c. The Expected Problem with China’s Pension System

China will soon be faced with the same problem as many developed nations – a declining fertility rate combined with a rapidly aging population. Unlike most “first world” countries, however, China lacks the necessary social security infrastructure to support the needs of its elderly population. As a Beijing University professor commented, “Instead of tinkering with
family-planning policy, China needs to tackle its social-welfare system [in order] to figure out who is going to take care of our parents and grandparents."\(^1^6\)

As of 2002, the statistics of pension coverage for the elderly are as follows:

- **Those With Family**
  Less than 17 percent of the senior population that is financially supported by family currently receives pensions.\(^1^7\) Amongst the rural population, government support is virtually non-existent; indeed, seniors depend almost wholly on support from their children due to the lack of a social welfare infrastructure in rural regions.

- **Those Without Family**
  In China, those who are childless or do not live with their children make up 25.8 percent of the total elderly population; in Beijing, the rate is higher at 34 percent.\(^1^8\) Without any family, these individuals depend largely on government support.


With China’s large population of young urban workers either at – or nearing – retirement by 2025, China will find it increasingly difficult to meet its goal of establishing a series of social endowment assurances and benefits for the aged by 2010. As Figure 7 above reveals, China has faced a declining ratio of workers to pensioners over the past few decades as the number of pensioners has increased. Moreover, current trends are only expected to persist in the future. As Table 6 indicates, China is expected to have approximately 91.3 million retirees in 2030 and need over 7.3 trillion Yuan in order to meet the pension costs of retirees for that year alone.
Table 6: Number of Retirees and Pension Sum Projections, 2000-2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Retirees (million)</th>
<th>Pension (billion Yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>36.5</td>
<td>209.9</td>
</tr>
<tr>
<td>2010</td>
<td>51.5</td>
<td>828.4</td>
</tr>
<tr>
<td>2020</td>
<td>70.7</td>
<td>2,814.50</td>
</tr>
<tr>
<td>2030</td>
<td>91.3</td>
<td>7,322.00</td>
</tr>
</tbody>
</table>


a. The Inadequacies of the Current Old Age Pension System

Mainly because of China’s rapidly aging population, the current “pay-as-you-go” pension system\(^\text{19}\) is on the verge of bankruptcy. Concurrently, the one-child policy is challenging the traditional family approach to caring for aged parents, which leaves the government to care for the elderly.

\(^{19}\) China’s “pay-as-you-go” pension system was created in 1995.
As a *McKinsey & Company* study (2002) demonstrated, in order to finance pensions the Chinese government must fill a gap that will come to $15 billion by 2005 and to $110 billion by 2010.\(^{20}\) This trend is highlighted in Figure 8 above. The study concludes: “major changes in government policy are needed to meet these obligations and to manage pension assets more professionally.”

---

b. **Old Age Security Reform in China**

Faced with falling proportions of workers to pensioners, declining income replacement levels, precarious funding and diminishing coverage of the labor force under the current system, China is undertaking major steps to reform its old age security system. Pension financing is being diversified, with the employer no longer serving as the sole contributor to the pension fund. Employees must now make contributions as well, and the government is to contribute as needed in order to guarantee pensions. A shift to defined-contribution pensions and the listing of state-owned enterprises and the sale of state-owned shares is expected to help close the pension-funding gap – as well as make China's domestic equity market the most important in Asia outside Japan.\(^\text{21}\)

b. **Sustainability of the Reformed System**

The reformed urban system offers generous benefits, with “high-income replacement ratios and retirement at age 50 for women (age 55 for some women) and age 60 for men.” As China’s population ages, however, the pension system will be paying benefits to more people for longer periods of time as life expectancy continues to increase. Despite these demographics, Chinese officials have steered clear of any discussion of a possible reduction in benefits.

For the new system to remain financially sound, it is important that all participants meet their obligations and that funds are profitably invested. Some firms and individuals are reluctant to join the new compulsory pension pools because of concerns over the adequacy of funding for current and future obligations. Currently, nearly one out of four participating enterprises – mainly loss-making state enterprises – needs government assistance in paying premiums.

d. Demographic Projections: Overview and Methodology

The undesirable social and demographic consequences of the one-child policy bring to question whether changes should be adopted to better meet the nation’s population goals. One of the proposed solutions is the widespread adoption of a “two-child policy.” Before proceeding with the analysis, it is important to note that the one-child policy is not strictly adhered to today. Indeed, non-compliance is widespread in rural areas, and exceptions to the one-child policy exist for all ethnic minority populations as well as other subgroups. For the purposes of my projections, however, I will begin by assuming that TFR data provided by the UN Population Division are reasonable estimate of China’s current fertility rates. In the following sections I will then proceed to examine how different China’s demographic structure might look from current UN projections through our own projections under new TFR assumptions. Thus, I hope to explore whether a “two-child policy” might balance out China’s age structure and help mitigate the problems that we have explored in the previous sections.

a. Overview of Spectrum Policy Model

In order to create a set of new population projections for China, I used the Spectrum Policy Modeling System to manipulate existing Census information on China and to project data under different demographic assumptions. Spectrum, used primarily by program planners and policy analysts, is a software program that integrates multiple demographic models from The POLICY Project (and its predecessor projects) to determine the consequences of any given population program and policy.

For the purposes of my study, I focused mainly on analyzing China’s changing age structure and dependency ratios through DemProj, a model used to make age-sex population projections. A full set of demographic indicators can also be displayed for
up to 50 years into the future.\textsuperscript{22} Demproj also provides an option to import the data needed to make a population projection from estimates provided by the UN Population Division.

In order to make projections based on my own assumptions (to reflect a two-child policy), I needed to manipulate the demographic parameters within the underlying Excel model. Hence, current forecasts for China under the one-child policy are based on UN Population Division (medium variant TFR) projections, while forecasts under a “two-child policy” are based on my own TFR assumptions. Aside from importing current UN statistics into the model, I also changed all of the data to that of the US Census Bureau’s International Data Base (IDB) in order to see if IDB statistics would yield different results. In the end, the results were not significantly different from those based on UN statistics, and I ended up using UN statistics imported from DemProj throughout the rest of my projections for the sake of consistency.

\textbf{b. Methodology}

The following, based on guidelines provided by the Spectrum Policy Model, are the main steps that I used to make my population projections for China in DemProj.

1. \textbf{Set geographic scope.} Although I had originally envisioned conducting a comparative study across three Asian countries with formal family planning policies (e.g., India, Vietnam and China), the scope of my research ended up becoming focused on China alone. Furthermore, due to difficulties in establishing the accuracy of census data in rural versus urban areas, I focused my population projections at the national level.

2. **Determine the period of the projection.** My population projections for China begin at the base year of 1990 and continue to 2050. Although the base year is often selected on the basis of data availability and is usually the year of the most recent census or large-scale survey, I chose not to use 2000 Census results from China’s *National Bureau of Statistics* due to concerns about underreporting and uncertainty as to whether the results will be revised in the near future for accuracy.

3. **Collect data.** At a minimum, base year data need to be collected for the number of people by age and sex, the TFR, and life expectancy at birth. A special feature of DemProj allows users to make a projection by importing data from the United Nations *World Population Prospects*. Although I ended up basing my projections on UN data, I first compared projections based on UN statistics with projections based on US Census Bureau *International Data Base* statistics. Since it is worth the effort to ensure that appropriate and high-quality data are collected and prepared before starting the projection, I wanted to ensure that both data sets would yield no significantly different results before I proceeded with using UN data.

4. **Make assumptions.** Population projections require assumptions about the future TFR, the life expectancy at birth, and international migration. Assumptions regarding the most appropriate model tables for fertility and mortality are also required. While most of my assumptions were based on UN forecasts, projections for China under a two-child policy required key assumptions about China’s TFR and ASFR. A more detailed discussion about the rationale behind my assumptions is included in the following section.

5. **Enter data.** After I entered in the base year inputs and decided upon my projection parameters, I used the DemProj model within Spectrum to make my
projections for China’s population – first under a one-child policy assumption, then under a two-child policy assumption.

6. **Examine projections.** It is important to examine population projections carefully once they are made in order to scrutinize the various demographic indicators produced. For the purposes of my research, my main considerations were the age and sex distribution of the projection as well as the total dependency ratios produced. Using both UN and US Census Bureau data sets, I checked each of these indicators against past forecasts to ensure that the base data and assumptions were understood and were entered correctly into the model. Furthermore, to calculate the breakdown of the Total Dependency Ratios, I used age-specific data from the total population projections to calculate the Youth and Elderly Dependency Ratios.

7. **Make alternative projections.** Once the base projections were made, I varied my TFR assumptions to generate alternative projections and to determine the sensitivity of my projections to alternative inputs.

e. **Demographic Projections: Key Assumptions and Inputs**

China’s future population age structure depends mainly on changes in a few basic demographic variables: (1) the current population, (2) fertility rates, (3) mortality trends and (4) international migration. Since net international migration is not a significant component of population change in most countries, migration can often be ignored without any noteworthy effect on the population projection. Thus, my main assumptions focused on China’s current demographic picture (i.e., base year assumptions) as well as possible changes in China’s future fertility (TFR) and mortality (i.e., life expectancy) rates.
a. Base Year Assumptions

To find base year data for my projections, I referred to both the UN Population Division and US Census Bureau databases. The UN Population Division publishes a considerable amount of population data, and I relied heavily on two sources: (1) the *Demographic Yearbook*, which contains the most recent census data for most countries, and (2) the *World Population Prospects*, which is published every two years and contains population estimates and projections for most countries of the world. The latest edition of *World Population Prospects* was a particularly useful source, since it contains estimates of base year populations that have been adjusted for misreporting as well as assumptions about future levels of fertility, mortality and migration. This can be used when reliable census data are not available. Aside from using UN data, I also ran each of my projections with US Census Bureau International Data Base statistics to ensure that a slightly different set of estimates would yield similar results.

Although the best source for setting China’s base year population assumptions is usually a national census, I chose to use UN and US Census Bureau data over statistics from China’s 2000 Census because several problems can exist in raw census figures, including underreporting and misreporting. Underreporting occurs in China for a variety of reasons. One big reason is that census respondents intentionally misreport in order to avoid punishment for having more children than allowed for under the one-child policy. Secondly, age misreporting can occur when ages are purposely or unintentionally reported incorrectly, such as when ages are rounded to the nearest five-year age group or when ages are unknown. These problems should be corrected through standard demographic procedures and reported in later census reports, but in many developing countries these reports may
not be done or may only appear many years after the census is completed. Hence, I chose not to use raw census tables from China’s National Bureau of Statistics.

b. Fertility Rate Assumptions

The key variable in any population projection is the TFR; however, assumptions about future changes in TFR – especially for a developing country like China – are usually subject to a wide range of uncertainty. In my TFR assumptions, I attempt to take into account both the effects of China’s current family planning policy and the continued acceptance of the one-child policy in China.

i. TFR: One-Child Policy Projection

According to recent US Census Bureau estimates, China’s TFR is currently around 1.7 children per woman. This coincides with UN Population Division estimates, which places China’s TFR somewhere between 1.7 and 1.9 children per woman. In my projection assumptions for China under the one-child policy, I imported UN fertility rate forecasts into the Demproj model. In this data, three assumptions were made concerning possible changes in China’s future fertility levels – low, medium and high variants. The low variant assumes that TFR will decline from its “base year” level of 2.2 in 1990 to a steady TFR of approximately 1.7 by 2050. The medium and high variants assume that TFR will decline from the 1990 “base year” level to 1.85 and 1.95, respectively, and then remain at those fertility rates until 2050.

In general, the Chinese government would consider a TFR of about 1.65 children per woman as the target fertility rate under a strictly enforced family planning program. The reason why the current (high variant) TFR is just about double the policy limit of one child per woman is two-fold; many
exceptions to the one-child policy currently exist, and non-compliance with family planning policy is high in rural regions. Due to high monitoring costs in rural areas as well as the effects of regional discretion, most villagers are exceeding the “allotted” quotas for children. It is only in urban areas where we are more likely to see enforced compliance with the one-child policy. The statistical impact of high fertility rates in rural areas drives up the nationwide average TFR.

ii. TFR: Two-Child Policy Projection

With a change to a two-child policy, I assumed that overall TFR would increase from existing projections by an additional child per woman. Since a TFR of 1.85 — which allows for women to have around two children — is already the current 50-year (medium variant) projection for China under a one-child policy, I assumed that a TFR of 2.85 would be an appropriate 50-year projection rate for China under a two-child policy, given similar assumptions about general non-compliance and exceptions to the rule. Accordingly, I took the UN’s medium variant scenario and increased the TFR estimates by one child per woman for each year in the projection period. Beginning with the “base year” TFR, I adjusted fertility rates up from 1.19 to 2.19 children per woman in 1990, and so on and so forth for each year until the TFR reached a steady state of 2.85 children per woman until 2050.

In reality, I would expect overall TFR to increase by less than one child per woman due to the expectation that the new policy would only impact the fertility rates in urban areas, while having little to no effect on the current

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23 26.44% of China’s total population resided in urban areas at the time of the 1990 Census, according to the US Census Bureau International Data Base, 2004.
fertility rates in rural areas. This stems from the rationale that allowing women to have an additional child under the “two-child policy” would increase TFR primarily in urban areas, where current compliance with the one-child policy is high. Allowing for an additional child in rural areas, where people are not complying with the one-child policy in the first place, should not affect their behavioral patterns in any way other than making them feel more comfortable in reporting an additional child to national census takers.

Since census underreporting is already adjusted for by organizations such as the UN Population Division, the statistical impact of allowing for another child should be minimal for non-urban areas. An example of this adjustment is the “base year” TFR of 2.2 under the one-child policy, which corresponds to a fertility level under a loosely enforced family planning program. Hence, the assumption that aggregate TFR increases by one child per woman under a “two-child policy” probably yields population projections that fall on the high range of results.

c. Mortality Rate Assumptions

Assumptions about mortality rates can be made with a greater degree of accuracy than fertility rate assumptions. This is because general trends for life expectancy (LE) are much more stable and predictable than changes in TFR. In my projections for China under both the one- and two-child policy assumptions, I imported UN Population Division estimates about changes in China’s future life expectancies. Beginning with a “base year” LE of 67.8 in 1990, LE is expected to increase to 70.6 years by 1997 and then continue increasing until it reaches 81 years by 2050. In the summary output, the life expectancies of males and females are separated out, with females averaging higher life expectancies at birth than males.
Table 7: Demographic Inputs and Assumptions

The following table summarizes my key assumptions for each of the seven main inputs.

<table>
<thead>
<tr>
<th>Demographic Input</th>
<th>Main Assumptions and Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Current Population</td>
<td>1. Set 1990 set as the Base Year</td>
</tr>
<tr>
<td></td>
<td>2. Base Year Fertility: 1990 TFR = 2.2</td>
</tr>
<tr>
<td></td>
<td>3. Assumed current TFRs (UN medium variant) are a reasonable estimate of fertility rates in China</td>
</tr>
<tr>
<td>(B) Total Fertility Rates (TFR)</td>
<td>4. Imported projections, UN Population Division</td>
</tr>
<tr>
<td></td>
<td>5. New TFR = Current TFR + one child per woman</td>
</tr>
<tr>
<td></td>
<td>▪ Assumed adding an additional child to the current TFR would be a reasonable estimate of China’s fertility if allowed one more child per couple</td>
</tr>
<tr>
<td>(C) Age-Specific Fertility Rates (ASFR)</td>
<td>6. Imported projections, UN Population Division</td>
</tr>
<tr>
<td></td>
<td>7. Entered as the percentage of lifetime fertility that occurs in the following five-year age groups:</td>
</tr>
<tr>
<td></td>
<td>▪ These figures were used in addition to the TFR, since the age distribution of fertility is also required to make a projection</td>
</tr>
<tr>
<td>(D) Sex Ratio at Birth</td>
<td>8. Imported projections, UN Population Division</td>
</tr>
<tr>
<td>(E) Life Expectancy</td>
<td>9. Base Year LE: 1990 LE = 67.8</td>
</tr>
<tr>
<td>at Birth (LE)</td>
<td>10. Imported projections, UN Population Division</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>(F) Model Life Table</td>
<td>11. Used the Coale-Demeny West model life table</td>
</tr>
<tr>
<td>(G) International Migration Trends</td>
<td>12. Assumed zero international migration</td>
</tr>
<tr>
<td></td>
<td>- Since net international migration is not a major component of population change in most countries, migration can often be ignored without a significant effect on the population projection</td>
</tr>
</tbody>
</table>

**f. Demographic Projections: Results From Adjusted Inputs and Assumptions**

Based on the seven main inputs and assumptions from above, I performed 50-year population forecasts (by age and gender) for China under both one-child and two-child policy scenarios in Spectrum’s DemProj model. For the convenience of analysis in this section, I will focus on just the medium variant projections.

**a. Population Pyramids**

My projections for China’s population pyramids under a one-child policy assumption mirror the age-sex pyramids currently provided by the US Census Bureau International Data Base; in Figure 9a we see that the proportions of children, young adults and the bulk of the working age population decline significantly over the projection period, while the proportion of the elderly population increases dramatically. Projections under the UN medium variant TFR thus yield an inverted pyramid by the year 2050. In contrast, the UN medium variant assumption that reflects a “two-child policy” yields a much more balanced age-sex pyramid by the end of the projection period. By increasing the TFR assumption in my Spectrum model,
instead of the inverted triangle, a rectangular-shaped population pyramid emerges by 2050 (Figure 9b).

Figure 9: Projected Age-Sex Pyramids Under Different Policy Scenarios, 1990 & 2050

(a) One-Child Policy Scenario (Medium Variant)

(b) Two-Child Policy Scenario (Medium Variant)
Projections for China’s total working age and total elderly dependent populations are shown in Figure 10. Although the elderly dependent population, aged 65+ – as well as the “elderly, elderly” components of the aged dependent population (aged 75–79 and aged 80+) – are higher in absolute terms under two-child policy projections, a considerably greater percentage of the total population also consists of working aged individuals who can help to support the financial costs of these dependents.

Figure 10: Projections of Productive (15–64) and Dependent (65+) Aged Populations in China Under Different Policy Scenarios, 1990–2050

(a) Working Population, age 15-64

(b) Elderly Dependent Population, age 65+

Source: Charts created with projections from *Spectrum Policy Modeling System* (Version 2.26).

Overall, trends indicate that a two-child policy assumption would shift the age structure to yield a greater productive population.

b. Changing Dependency Ratios

As we have explored in previous sections, the major issue arising from the aging of China’s population is the projected increases in the dependency ratio under the one-child policy. A two-child policy could address this problem because the more balanced age-sex pyramid means that there exists a proportionately larger working age population to support the elderly aged 65 and older, which would obviously drive down dependency ratios (Figure 11). From a policy-making perspective, this would mitigate the magnitude of the problem that the central government must face in the upcoming decades in supporting the growing public costs of elderly dependents.
Figure 11: Elderly Dependency Ratios in China, 1990-2050

Current One-Child Policy vs. Projected Under Adjusted Assumptions

Table 8 below indicates how the elderly dependency ratios change under both policy assumptions. Compared to current projections for the one-child policy, the elderly dependency ratio is projected to decrease by 2.24 in 2005 and by as much as 14.17 elderly dependents per working member under a two-child policy assumption in 2050. Clearly, a two-child (medium variant) assumption yields a much smaller elderly dependency ratio than the one-child (medium variant) assumption over the projection period. However, taking the medium fertility and medium expectation of life at birth scenario as an example, the total aggregated dependency ratio still shows an increase due to the greater number of youth dependents being born under a two-child policy scenario. As far as policy choices are concerned, the composition of the total dependency ratio will change; the anticipated benefit of a two-child policy assumption would be a decrease in the elderly dependency ratio, while the tradeoffs

would include the temporary increase in the youth dependency ratio as well as the ultimate increase in total population. It should be kept in mind, however, that the real dependency of an elderly person – including both the private and public costs of supporting an elderly dependent – is much higher than the costs of raising a child.

Table 8: Elderly Dependency Ratios in China, Current Projections (“As-Is”) and Projections Under New Assumptions (“Adjusted”)

<table>
<thead>
<tr>
<th></th>
<th>As-Is</th>
<th>Adjusted</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>9.03</td>
<td>8.82</td>
<td>0.21</td>
</tr>
<tr>
<td>1972</td>
<td>9.06</td>
<td>8.69</td>
<td>0.38</td>
</tr>
<tr>
<td>1973</td>
<td>9.07</td>
<td>8.56</td>
<td>0.51</td>
</tr>
<tr>
<td>1974</td>
<td>9.08</td>
<td>8.61</td>
<td>0.47</td>
</tr>
<tr>
<td>1975</td>
<td>9.08</td>
<td>8.65</td>
<td>0.43</td>
</tr>
<tr>
<td>1976</td>
<td>9.07</td>
<td>8.54</td>
<td>0.53</td>
</tr>
<tr>
<td>1977</td>
<td>9.05</td>
<td>8.44</td>
<td>0.62</td>
</tr>
<tr>
<td>1978</td>
<td>9.03</td>
<td>8.35</td>
<td>0.68</td>
</tr>
<tr>
<td>1979</td>
<td>8.99</td>
<td>8.26</td>
<td>0.73</td>
</tr>
<tr>
<td>1980</td>
<td>8.95</td>
<td>8.19</td>
<td>0.76</td>
</tr>
<tr>
<td>1985</td>
<td>8.65</td>
<td>7.71</td>
<td>0.94</td>
</tr>
<tr>
<td>1990</td>
<td>8.55</td>
<td>7.47</td>
<td>1.08</td>
</tr>
<tr>
<td>1995</td>
<td>8.76</td>
<td>7.36</td>
<td>1.40</td>
</tr>
<tr>
<td>2000</td>
<td>9.40</td>
<td>7.62</td>
<td>1.78</td>
</tr>
<tr>
<td>2005</td>
<td>9.63</td>
<td>7.39</td>
<td>2.24</td>
</tr>
<tr>
<td>2010</td>
<td>10.06</td>
<td>7.39</td>
<td>2.67</td>
</tr>
<tr>
<td>2015</td>
<td>11.49</td>
<td>7.94</td>
<td>3.55</td>
</tr>
</tbody>
</table>
In January 2003, Zhang Weiqing, minister of China’s State Family Planning Commission, announced a three-part family planning program whose goals are outlined below:

- Keep the population from exceeding:
  - 1.33 billion people by 2005,
  - 1.4 billion people by 2010,
  - 1.5 billion people by 2020,
  - 1.6 billion people by 2050 with zero growth.
- Raise China’s per-capita GDP to $3,000 by 2020.
- Ease the imbalance between human resources and China’s economic development.

In order to achieve these population goals, the government plans to set up family planning centers, increase the availability of contraceptive services and maintain its one-child policy. Current US Census Bureau projections suggest that China should be able to make each of these population targets under the one-child policy as it stands. Given that the government can meet its demographic objectives by upholding current policy, the following analysis...
attempts to quantify the tradeoff (i.e., the expected increase in total population) that the
government would have to make by adopting a two-child policy.

a. **Total Population Growth**

Under the current one-child policy TFR, the total population peaks at 1.45 billion
around 2030 and gradually declines to 1.43 billion by 2040–2050 (Figure 12a).
Despite the imbalance in the population age structure, overall population under the
one-child policy is expected to stay within the Chinese government’s target
population goals for the next half century. Given the adjusted TFR assumption under
a two-child policy scenario, however, the total population grows from 1.35 billion in
2001 to slightly over 2 billion by 2040 (Figure 12b). The additional 0.55–0.57 billion
in population is the tradeoff that would have to be made in order to achieve a more
balanced age-sex population structure by switching from a one- to a two-child policy.

Figure 12: Total Population Growth Under Different Policy Scenarios, 1990–2050

(a) Under One-Child Policy Scenario, (Medium Variant)
(b) Under Two-Child Policy Scenario, (Medium Variant)


It should be noted, however, that the population projection under a two-child policy assumption (Figure 12b) represents the upper bound on total population growth in China. This is mainly because the forecast assumes that allowing for couples to have two children increases the TFR by exactly one additional child per woman (on top of China’s current fertility rates), without accounting for the differences in urban and rural TFRs due to census underreporting. It can be argued that even if all women who currently have one child decide to have an additional child, only urban regions should experience a full one child increase in the TFR. On the other hand, an allowance for two children should not significantly influence reproductive behavior in rural areas, where non-compliance with official family planning policy is widespread. Furthermore, attitudes about childbearing and the roles of women in society are changing; women themselves are beginning to choose to have only one
child or to forgo childbearing altogether due to career aspirations. Hence, the increase in total population should be less in reality than the two-child policy projection indicates.

Prior literature supports my argument that total population growth – which is the trade-off to achieving a more balanced age structure under a two-child policy – probably will not be as high as Figure 12b suggests. A notable study published by John Bongaarts and Susan Greenhalgh (1985) demonstrates that a two-child policy alternative can be equally as effective as a one-child policy in achieving China’s official population goals. Bongaarts and Greenhalgh show that by altering current family planning rules – e.g., setting a minimum age for the first birth and a minimum interval for spacing between first and second births – Chinese policymakers can stabilize the population size at one-child policy targets while allowing for two children per woman. The study concludes that there should be only minor differences between a one-child policy and a stop-at-two policy with a minimum age at first birth of 27 years.24 Furthermore, a two-child policy would also be easier to implement and result in fewer detrimental consequences for Chinese society and economy.

b. Costs and Benefits of Two-Child Policy

Even if a “two-child policy” results in a larger overall population (including a greater number of children being born and eventually more senior citizens needing financial support), the proportionately greater increase in the working population would help offset dependency costs at the individual – rather than the governmental – level. Since a larger youth population means that there will be more people entering into the workforce in the future, this would lower the elderly dependency ratio and allow

the government to transfer to families (and the private sector) more of the financial responsibilities of supporting elderly dependents. A larger working population also promotes China’s GDP and continued economic growth. Other benefits and drawbacks to implementing a “two-child policy” are summarized below (Table 9).

Table 9: Summary of Costs and Benefits of Implementing a “Two-Child Policy”

<table>
<thead>
<tr>
<th>Summary of Costs</th>
<th>Summary of Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowing for two children will increase costs to the government due to the increase in <em>total</em> number of youth dependents.</td>
<td>More youth dependents being born means there will be more people to join the workforce in 15 years when they come of age.</td>
</tr>
<tr>
<td>This also results in increased costs to the government due to the increase in <em>total</em> number of elderly dependents.</td>
<td>Hence, the increase in youth dependency burden will be a temporary trend during the transition from one-child to two-child policy.</td>
</tr>
<tr>
<td></td>
<td>Dramatic increase in the working population means that there will be proportionately more people to support the elderly dependent population in the near future.</td>
</tr>
<tr>
<td></td>
<td>This gives the government some breathing room (both in terms of money and time) to figure out how to reform the currently inadequate social security system.</td>
</tr>
<tr>
<td></td>
<td>A larger economically productive population means greater economic growth for China.</td>
</tr>
</tbody>
</table>
A move from the one-child policy to a two-child policy will increase China’s total population. The magnitude of the change would depend on whether the two-child policy incorporates elements such as minimum age and birth spacing requirements.

A two-child policy means greater individual reproductive freedoms and less of a break with family culture and Chinese tradition.

h. Implications and Conclusions

In my analysis of the consensus estimates of China’s 50-year population trends, it is clear that China will be faced with several daunting challenges. First, there will be a drastic increase in the amount, and proportion, of elderly people. Second, the working population in relation to the elderly and other dependent populations will fall drastically. And finally, these two issues will culminate in a major disruption in China’s pension and elderly-care systems. These trends translate into a growing economic burden for families and the government as well as a smaller productive population to contribute to the nation’s economic growth. Contrary to what current policymakers have stated, it is my strong belief that it will be very difficult for China to reach their stated GDP per capita targets given the end-state age structure and implicit age imbalance.

My analysis suggests that changes in total fertility rates (as a proxy for a shift from the current one-child policy to a two-child policy) and in age-specific fertility rates (as a model input to account for fertility patterns by age group) would help alleviate China’s demographic challenges. Although the net benefits of such changes do not clearly outweigh the potential costs, these changes indicate that, directionally, further examination of such proposals is
highly recommended. The confidence I exhibit in the large potential benefits of such changes is based on the output of my demographic model that clearly shows a more balanced population age-sex structure by 2050. Rather than an inverted pyramid (as the UN currently forecasts), my changes result in a structure with a larger working population as well as a lower elderly dependency ratio.

The problems that China will face over the next 50 years are not unique. Arguably, these problems are the same problems that the US, Japan and Western European countries are either facing today, or will be facing over the next half century. The problem, though, seems more troublesome for China because of three unique situations. First of all, China truly lacks the pension and elderly-care infrastructure that these other nations possess. While it can be argued as to whether the US or Japanese systems are “effective,” it cannot be argued that China’s infrastructure is even close to being comparable to that of a developed nation. Secondly, the magnitude of the problem is indeed bigger for China. UN forecasts for the population breakdown in China indicates that the elderly portion is a significantly larger piece of the population pie in China than in other developed nations. This problem is magnified by the sheer magnitude of China’s population base. Since the total population is so much larger, the total number of expected elderly people is going to be significantly greater than in any other nation experiencing similar aging trends. The final reason that the problem is so much more troubling for China is that they have less time to respond to these challenges. Because the “tempo of population aging in developing countries is more rapid than in developed countries,” China will have less time than its developed counterparts to respond to the demographic challenges that it faces.
i. Further Issues and Research Questions

The results of this research indicate that a two-child policy is worth further research and policy consideration. Given more time to pursue this research, some issues and questions that I would like to explore in more detail include:

- Could China really reach their GDP and GDP-per-capita targets with such an exaggerated inverted population pyramid that exists today? It is counter-intuitive to believe that such a small working class could drive the expected economic growth under current family planning policy.

- What is the real cost per capita for a youth dependent versus an elderly dependent? What is the net benefit, or cost, of increasing the number of youth dependents through a two-child policy? In the US, studies have proven that the total cost of raising a youth is a fraction of the cost of supporting an elderly dependent in a nursing home.\(^\text{25}\)

- What do the demographic trends look like over an even longer time frame? Would population control policy have any lasting impact on China’s population or is the impact of policy intervention merely transitional? As Nobel Prize-winner Robert Solow has pointed out: “The initial effect [of an increase in the birthrate] would be to increase the dependency ratio… However, if the birthrate eventually reverts to the maintenance level, the end result will have been a second baby boom; the new boomers will, for a while, lower the dependency rate when they are all working; they will then worsen it again when they retire, and eventually disappear…”

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\(^{25}\) In the United States, the cost of raising a child to age 18 is estimated conservatively at $200,000 ($300,000 if the child goes to college) – or between $11,000 to $17,000 per year. By comparison, the average annual cost of maintaining an aged person in a nursing home is about $40,000 a year, with the average stay being three years.
Are the social security and pension reforms currently proposed to replace the deficient “pay-as-you-go” pension system in China sustainable?

However, possible challenges that future scholars might encounter in exploring these further research questions include:

- A lack of reliable data
- The absence of population forecasts beyond 2050
- The impossibility of ever knowing the true TFR due to prevalent underreporting and misreporting of official Census data
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