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**Demographic Transition amidst Socioeconomic and
Policy Changes in China**

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Demographic Transition amidst socioeconomic and policy changes in China

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Introduction

Following the launching of family planning programmes in the 1960s and 1970s, many Asian countries have experienced rapid fertility decline, while mortality level had started to decline earlier. Researchers have attempted to assess the relative contributions of family planning programmes and socio-economic changes to fertility decline.

In the past, demographers were mainly concerned with the adverse effects of rapid population growth on the economy and the wellbeing of the families. However, the continuing decline in fertility, to below replacement level in some countries, has also caught the attention of policy makers and researchers, as governments have revised their official view and policy to prepare for the consequences of low fertility, such as population ageing, changing family structure and labour shortage.

Table 1: Population and rate of population growth, China, 1950-2010

Year	Population	Annual rate of growth
1950	543 776	2.00
1955	600 995	2.001
1960	650 680	1.589
1965	711 547	1.788
1970	814 378	2.700
1975	913 570	2.299
1980	984 016	1.486
1985	1 062 299	1.531
1990	1 165 429	1.853
1995	1 237 531	1.201
2000	1 280 429	0.682
2005	1 318 177	0.581
2010	1 359 821	0.622

The population of China makes up about one fifth of the world population. Hence, demographic changes in China will have far reaching implications globally. China is one of the countries that has undergone very rapid demographic transition since the 1970s. Although the population of China grew from about 0.544 billion in 1950 to 1.36 billion in 2010, the rate of population growth has decelerated from about 2 percent then to just 0.6 percent now, as a result of rapid fertility decline during since the 1970s (Table 1). In 1950, the population of China was 45%

larger than that of India, but by 2010, China's population at 1,359,821 thousand was only 12.8% larger than that of India. According to projection by the United Nations, India will take over as the number one demographic giant in 2028.

The demographic transition in China was led by mortality decline, followed by fertility decline, with a lapse of time. The crude death rate fell sharply from 21 per thousand population in the 1950s and the first half of 1960s to 10 per thousand in 1965-1970, and then gradually to 7 per thousand since the 1980s. The adoption of the family planning programme in 1970s accelerated the fertility decline which had already started since the 1950s. Between the period 1965-70 and 1970-75, the crude birth rate (CBR) fell by 17 percent from 37 per thousand population to 31 per thousand population, as compared to a decline of 5 percent between 1960-65 and 1965-1970. Following the adoption of the "One-child" policy in 1979, the CBR again fell sharply, from 26 per thousand population in 1985-1990 to 19 in 1990-1995 and further to 14 in 1995-2000 (Table 1). China now joins the neighboring East Asian countries Korea and Japan in having the lowest low fertility in the world.

Until recently, China has a closed population. The crude rate of natural increase corresponded closely the rate of population growth. However, some out-flows could be detected in the new millennium as the rate of population growth lagged behind the rate of natural increase. The World Development Report shows a net out-flow of 1,884,102 in 2011 and 2,298,055 in 2005.

Table 2: Crude birth rate, crude death rate, crude rate of natural increase and rate of population growth

Year	Per thousand			%
	CBR	CDR	CRNI	Rate of growth
1950-1955	42	22	20	2.00
1955-1960	36	21	16	1.59
1960-1965	39	21	18	1.79
1965-1970	37	10	27	2.70
1970-1975	31	8	23	2.30
1975-1980	22	7	15	1.49
1980-1985	22	7	15	1.53
1985-1990	26	7	19	1.85
1990-1995	19	7	12	1.20
1995-2000	14	7	7	0.68
2000-2005	12	6	6	0.58
2005-2010	13	7	7	0.62

Theoretical framework, research questions and objectives

The demographic-economic paradox can be summed up with a familiar saying that “the rich get rich and the poor get children”. According to Malthus’s proposition, reproductive restraint arises naturally as a consequence of economic progress. At the first UN Population in 1974 in Bucharest, a former minister of India suggested that “development is the best contraceptive”. This position has been vindicated by numerous studies on fertility differentials which typically show the negative association between fertility and a host of socio-economic indicators such as urbanization, education, female labor force participation, women empowerment and family wealth. What then is the role of family planning in fertility reduction? Many studies have shown that fertility decline has been most remarkable in countries with a strong family planning program amidst rapid socio-economic development. As summed up by Meadows (undated), “Economic opportunity gives poor families other paths to security than having children. Family planning gives them affordable, acceptable ways to achieve that lower desired family size. One is the motor for fertility reduction, the other is the gas. Both are needed urgently, for the sake of both the rich and the poor” (http://www.sustainer.org/dhm_archive/index.php?displa_article=vn543famplanninged).

The extraordinary speed of fertility decline in China was attributed to the government’s campaign on later-longer-fewer and one-child birth limitation, although rapid socio-economic changes have also contributed to fertility decline (Shi, 1990; Bongaart and Greenhalgh (1985). China’s One-child policy has even been touted as the one policy that changed the world (Potts, 2006). The Policy while highly effective in bringing down the fertility level, has been very controversial and widely debated, including the discord between USAID and UNFPA over the coercive family planning programme in China. Many articles on China’s One-child policy have been published widely (Bongaarts and Greenhalgh, 1985; Green L.W, 1988, Greenhalgh, 1990; Banister, 1984; Potts, 2006; Hong, 1987; Greenhalgh, and Bongaarts, 1987; Shi, 1990)

This paper aims to examine the demographic changes amidst the socio-economic and policy changes in China, the association between socio-economic changes as measured by increase in life expectancy, urbanization, rising education, income level and non-agricultural employment. It will also discuss the consequences of prolonged below replacement level fertility level on the age-sex structure of the population, the dependency burden, the labor force and the economy.

Data and Methods

Data for this paper are taken from the on-line database of the Population Division, United Nations, and also from World Bank’s World Development Report.. This is augmented by data sources of published reports and articles, as cited. This paper focuses on analysis of fertility trend. The total fertility rate (TFR) is used instead of crude birth rate, because the latter is affected by the changing age structure of the population, especially women in the reproductive age groups. TFR is defined as the number of children that a woman would give birth to subject to the prevailing fertility and mortality conditions. Scatter plots are used to examine the associations between demographic and socio-economic variables over different periods.

Results

Socio-economic Changes

To address the demographic- economic paradox, this sub-section provides an overview of the changes in socio-economic conditions and the evolution of family planning and population policy in China since 1960 when fertility began to decline.

Since the 1949 Revolution and the establishment of the People's Republic, China has experienced fundamental socio-economic changes, as summarized in Table 3. The human development index (HDI), a composite index based on income, education and health (as measured by life expectancy) shows that the socio-economic condition in China has been improving since 1980 when data on HDI was first reported. Between 1980 and 2010, the HDI of China had increased from 0.407 to 0.689, and it is ranked as a medium HDI country at 101 out of 186 countries.

Life expectancy at birth had risen remarkably from a low of 45 years in 1960, and 44 years in 1965 to 59.4 years in 1970 and continued to increase to 74.4 years in 2010. Infant mortality rate declined phenomenally by half from 121 per thousand births in 1965 to 63 in 1970, and continued its downward trend to 18 in 2010.

Improvements in income and educational level as well as urbanization level have been much more recent, mostly taking off as recently as 1990s. . some of which have been rather recent. For instance, the extraordinary rise in GDP per capita and tertiary education began only in the 1990s, as shown in Table 3. With the restructuring of the economy moving away from agriculture to manufacturing and services, the economy has been growing at a rapid pace of around 10 percent per annum since 1985. The GDP per capita (constant 2005 US\$) was very low at US\$ 125 back in 1960, and rose to US\$463 in 1990. Consequent upon rapid economic development since the 1990, the GDP per capita has registered phenomenal increase from US\$778 in 1995 to US\$2,869 in 2010.

Data on secondary school enrolment for the period 1960-1990 appear rather erratic, probably due to poor recording. However, since 1990, the gross enrolment ratio for secondary education rose sharply from 37.7 percent to 81.2% in 2010, with the most precipitous increase between 2005 and 2010, from 66.8% to 81.2 %. Tertiary enrolment ratio was a low 0.13% in 1970, and was still rather low at 8.0% in 2000, but over a decade the tertiary enrolment ratio shot up to 25.9% in 2010. More significantly, women have been making educational advancement more rapidly than the men over the years such that they had overtaken men in secondary and tertiary education in 2010. In 1980 women made up only about a quarter of the teachers in secondary schools but they now make up about half. This signifies the empowerment of women which would have a strong on their marriage and childbearing behavior.

In many countries, urban couples tend to have smaller family size as compared to their rural counterparts. Owing to industrialization and structural changes in the economy, the urban population has been growing rapidly at above 3.2% to close to 5% for of the periods, interrupted only in the 1970s during the Great Leap Forward and Cultural Revolution. Given that the crude rate of natural increase of less than 2 percent per annum prior to 1990 and less than 1% post 1990 even at the national level (note that we would expect a lower rate of natural increase in the urban areas), the rural- urban exodus is all too evident. Up until 1990, only about a quarter of the population in China were living in urban areas, today half of the population are urban dwellers, and about one in five are living in cities with more than one million population, up from about 8% for the period 1960-1985. Population redistribution and concentration in large cities has hastened demographic transition.

Up until the 1990s, China was primarily a rural agrarian society. However, with industrialization and modernization, employment in manufacturing and services sector has increased rapidly at the expense of the agricultural sector. Between 1980 and 2010, the percentage of workers in the manufacturing sector and services sector rose from 18.2% and 13.1% to 28.7% and 34.6% respectively. The shift from agriculture to the modern sector employment will also affect the family formation and reproductive behavior as agricultural workers tend to have more children to provide the extra labor in the farm, while working women in the modern labor market face a host of constraint in childcare due to the incompatibility of work and maternal roles.

Table 3: Socio-economic and demographic changes in China, 1960-2010

Year	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010
Human development index					0.407		0.495		0.590	0.637	0.689
Life expectancy at birth	45.01	43.97	59.42	64.58	66.29	67.71	68.92	69.95	70.86	73.41	74.44
Infant mortality rate	118	121	63	47	42	38	34	30	27	21	18
GDP per capita (const 2005 US\$)	125	118	145	172	220	343	463	778	1122	1731	2869
GDP Growth % per annum			7.4	6	6.6	10.8	7.9	12.3	8.6	9.8	11.2
Secondary gross enrolment ratio			27.8	50.8	46.1	31.7	37.7	52.2	62.1	66.8	81.2
Female secondary gross enrolment ratio					38.8	24.9	31.7	48.0	61.6	65.7	82.9
Tertiary gross enrolment ratio			0.13	0.48	1.16	2.18	3.04	4.5	8.0	19.4	25.9
Female tertiary gross enrolment ratio				0.34	0.59					18.5	27.2
Secondary school teachers (% female)					24.5	27.7	30.4	33.8	40.7	45	48.4
Urbanization level	16.2	18.1	17.4	17.4	19.4	22.9	26.4	31.0	35.9	42.5	49.2
% living in cities more than 1 million	7.9	8.3	7.7	7.6	7.9	8.6	9.4	11.7	15.3	17.9	20.6
Urban pop growth rate	4.8	4.5	2.0	1.8	3.3	4.5	4.2	4.0	3.6	3.8	3.2
% working in agriculture					68.7	62.4	60.1	52.2	50	44.8	36.7
% working in manufacturing					18.2	20.8	21.4	23.0	22.5	23.8	28.7
% working in services					13.1	16.8	18.5	24.8	27.5	31.4	34.6

Sources: World Development Report, 2010, Human Development Report, 2013.

The Evolution of Family Planning Policies in China

Soon after the establishment of the People's Republic of China, the government began to adopt policies aimed at birth control to slow down the rate of population growth. Phase I of the policy covering the period 1953-1957 was implemented to encourage couples to practise family planning to safeguard maternal and child health. At the same time, sterilization and abortion were legalized. Despite the initial support given by the top leadership comprising Party Chairman Mao Zedong, state President Liu Shaoqi and Premier Zhou En Lai, the family planning policy was shelved during the Great Leap Forward (1959-1961) on fear of labor shortage.

In the early 1960s, the family planning policy entered its second phase with the setting up of the first family planning organization. The focus then was directed at the urban areas to relieve the population pressure in densely populated coastal cities. As noted by Shi (1990), "Just as family

planning efforts were about to bear results, the Cultural Revolution, launched in 1966, halted and undermined all types of family planning work”. Disrupted by the two major events, family planning policies and programmes during the first two phases were ineffective in reducing the fertility, as couples still opted for large families. The total fertility rate actually rose from 5.5 in 1960 to 6.1 in 1965, and remained at 5.9 in 1970.

In the aftermath of the Cultural Revolution, and following Chairman Mao proclamation that “population must be put under control”, the family planning policy entered its third phase (1971-1978) where a sustained family planning programme was put into effect as part of the state planning. The main feature under Phase III was the campaign to popularize the two child families, with a slogan “later (marriage and childbearing), longer (birth spacing) and fewer (children). Under this phase, medical teams were sent to the rural areas to provide family planning services and contraceptives were provided free of charge. The policy also allowed for paid maternal leave. The family planning policy and programmes under this phase were very effective in promoting family planning and birth control as the contraceptive prevalence rate reached 70% in 1980, and total fertility rate plummeted from 4.8 to 3.0 in just five years as at 1980.

Up until 1978, family planning was largely voluntary. As the large cohort of the 1960s cohort would soon be starting families, family planning was officially included in the Constitution, and birth control has since been mandated and required, especially in the urban areas. In 1979 the Fifth National People’s Congress put forward a policy a “one child” per couple for the first time. Chairman Hua Gofeng and General Secretary Hu Yaobang called for restricting the total population to 1.2 billion in 2000. The urgency placed on birth control in China is reflected by the statements in support of the one-child policy by other top leaders of the day including Premiers Zhao Ziyang and Li Peng, and paramount leader Deng Xiao Peng. While allowing for regional variations, the “one-child” policy remains in force to this day. A more detailed description of the family planning policies, laws, regulations, rewards and penalty of the one-child policy is given by Shi (1990).

The one-child policy has been very effective in lowering the fertility level amidst rapid socioeconomic changes. The total fertility rate continued to decline from 3.0 in 1980 to replacement level of 2.05 in 1995 and has gone below replacement level since then, and it was at a level of 1.56 in year 2000, an auspicious Dragon year for childbearing.

Official statistics show that as many as 80% of children under age 14 have siblings, and this explains the total fertility of 1.5-1.6 despite the “One-child” policy. It must be borne in mind that the policy allows for regional variations in its implementation. While the policy has significantly lowered the birth rate to below replacement level, fertility level in the rural areas remains considerably higher. Rural families and ethnic minorities can legitimately have more than one child, especially if the first is a girl. Some have more than two in the quest for a male heir, and

either pay the fines if they can afford it or become migrants. City dwellers can also have a second child if both parents were only children (Reproductive Health Matters, 2003).

Table 4: Phases of People Republic of China’s Family Planning Policies

Phase	Period	Features	Rationale	Effectiveness
I (Encouragement stage)	1953-1957	Advocating birth control, legalized sterilization and abortion	Protect women and children.	Not effective
II (Participation stage)	1962-1966	Organizational set-up, targeting urban areas	Relieved urban population pressure.	Not effective
III (Target stage)	1971-1978	Popularize “Two child”; “later, longer, fewer”. Medical teams sent to rural areas, free contraceptives and paid maternity leave	Population control as part of the state planning.	Effective, fertility level fell sharply following the campaigns.
IV One-child stage	1979-	“One child” per couples; rewards and penalty	Population control as a prerequisite of modernization.	Highly effective, fertility declined sharply to below replacement level
V Revision stage		Revised “One-child” policy - For unauthorized births, parents pay a social compensation instead of a fine	Acknowledges the transformation of Chinese society	Yet to be seen

Source: Shi (1990), the column on effectiveness and Phase V inserted by the present author.

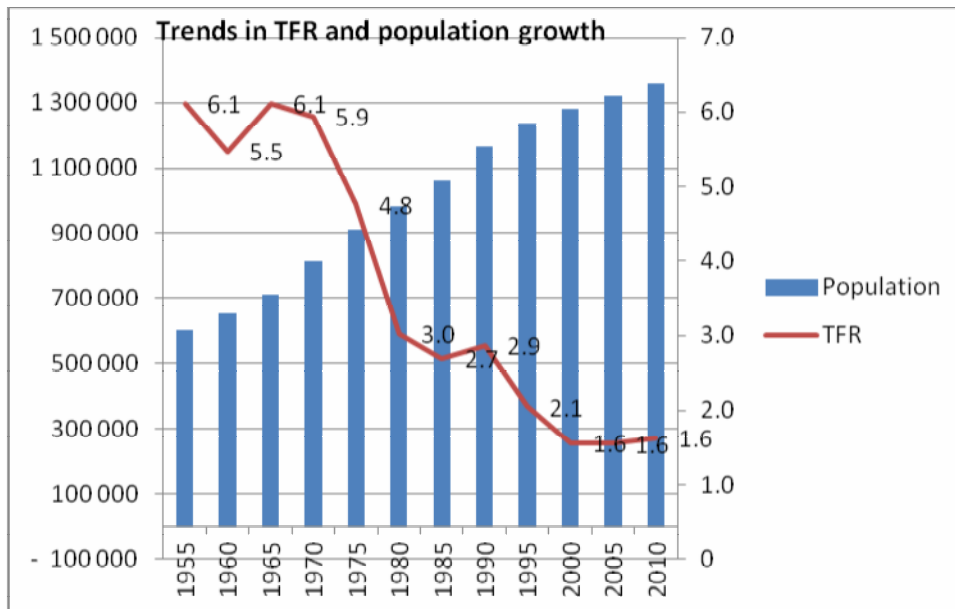
Phase V is based on Reproductive Health Matters, 2003.

The Fertility Level and Its Proximate Determinants

In 1970 at the beginning of Phase III of the family planning policy, the TFR of China was still at a high of about 6 children per woman. However, soon after the campaign to popularize the “two-child” family and “later” and “fewer” slogan, sending medical team to rural areas and provision of free contraceptives, the TFR declined rather sharply to 4.8 children within 5 years. The implementation of the “One-child” policy accelerated the fertility decline to 3 within the next five years (in 1980), and the downward trend continued as it reached replacement level in 1995, and sank below replacement since then (Figure 1) Today China has one of the lowest low fertility in the world, an extraordinary achievement, considering that the country had one of the highest fertility in the world in the 1950s.

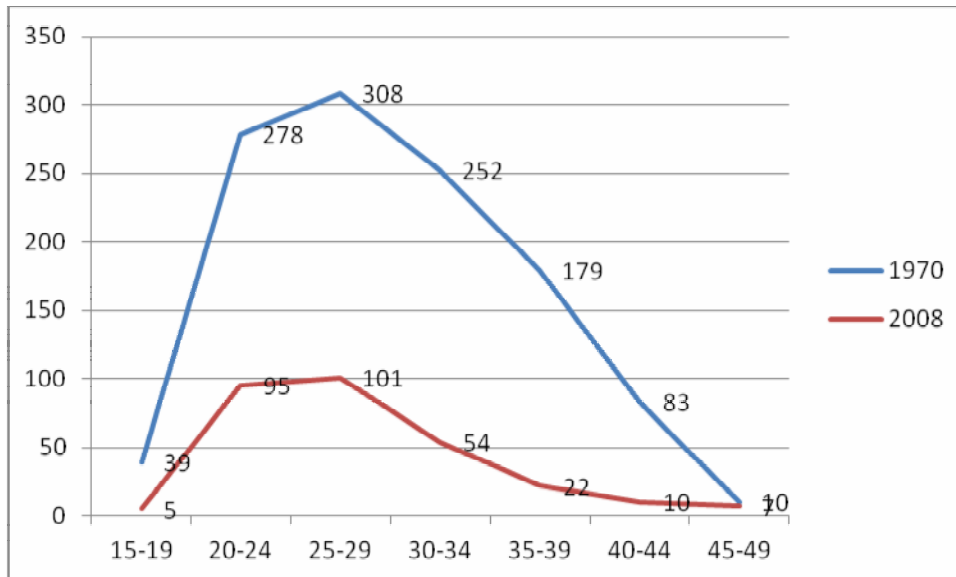
The population continued to increase up until today, due to the growth momentum as more young women are entering the reproductive age groups. As shown above, the crude birth rate is still higher than the crude death rate, giving a crude rate of natural increase of 0.7 percent per annum currently.

Figure 1: Trends in TFR and population growth



The fertility level has declined sharply for all reproductive age groups. Teenage births are rare and women are stopping childbearing younger. Among women in the prime reproductive age groups, the age specific fertility rates have fallen very sharply between 1970 and 2008 (Figure 2)

Figure 2: Age specific fertility rate, 1970, 2008, China

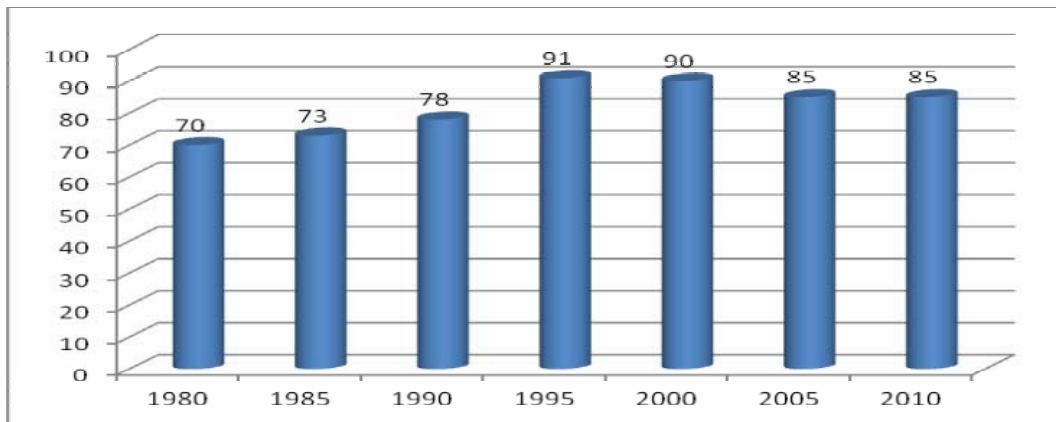


Next we examine the changes in the two main proximate determinants of fertility – contraceptive use and age at marriage. Data on contraceptive use were not available for earlier periods. Figure 1 shows that as at `1980, China already had a very high contraceptive prevalence rate (CPR) of 70 percent, and it continued to rise to a high of around 90 percent in 1995 and 2000, before reversing to 85% in since 2005 (Figure 3). This is still one of the highest in the world, and hence the unmet for contraception is a not an issue in China.

According to a survey in 1994, IUD and tube ligation were the two most popular methods, accounting for about 40% each, followed by vasectomy (11%). The pills and condoms accounted for only 3.2% each (Li, undated).

Marriage is near universal in China. Most women still marry at relatively young age. The singulate mean age at first marriage increased from 22.4 years in 1980-1990 to 23.3 years in 2000, and further to 24.7 years. Delayed marriage is likely due to increased enrolment in higher education.

Figure 3: Contraceptive prevalence rate. 1980-2010, China



Association between socioeconomic changes and fertility

There is abundant literature on the association between socioeconomic variables and fertility. Most of these variables are negatively correlated with fertility, and these include urbanization, income, women's education, work and employment, and contraceptive use. Infant mortality is one of the variables that correlates positively with fertility. When infant mortality rate is high, couples tend to have more children to ensure that they have the desired number of living children.

Figure 4 shows that the TFR had already reached a low level of 3.0 in 1980 and replacement level in 1995 when majority of the population were living in rural areas. This suggests that the family planning programmes implemented under Phase III which sent medical team to the rural areas and providing free contraceptives had achieved the desired goal of birth control, even before reaching a high urbanization level.

There is a strong negative association between non-agricultural employment and fertility, suggesting that structural changes in the economy towards modern sector employment has the effects of reducing the fertility level. Working women in the modern sector may choose to postpone marriage and have fewer children to pursue their career, and they are also more likely to confront the role incompatibility between work and childcare.

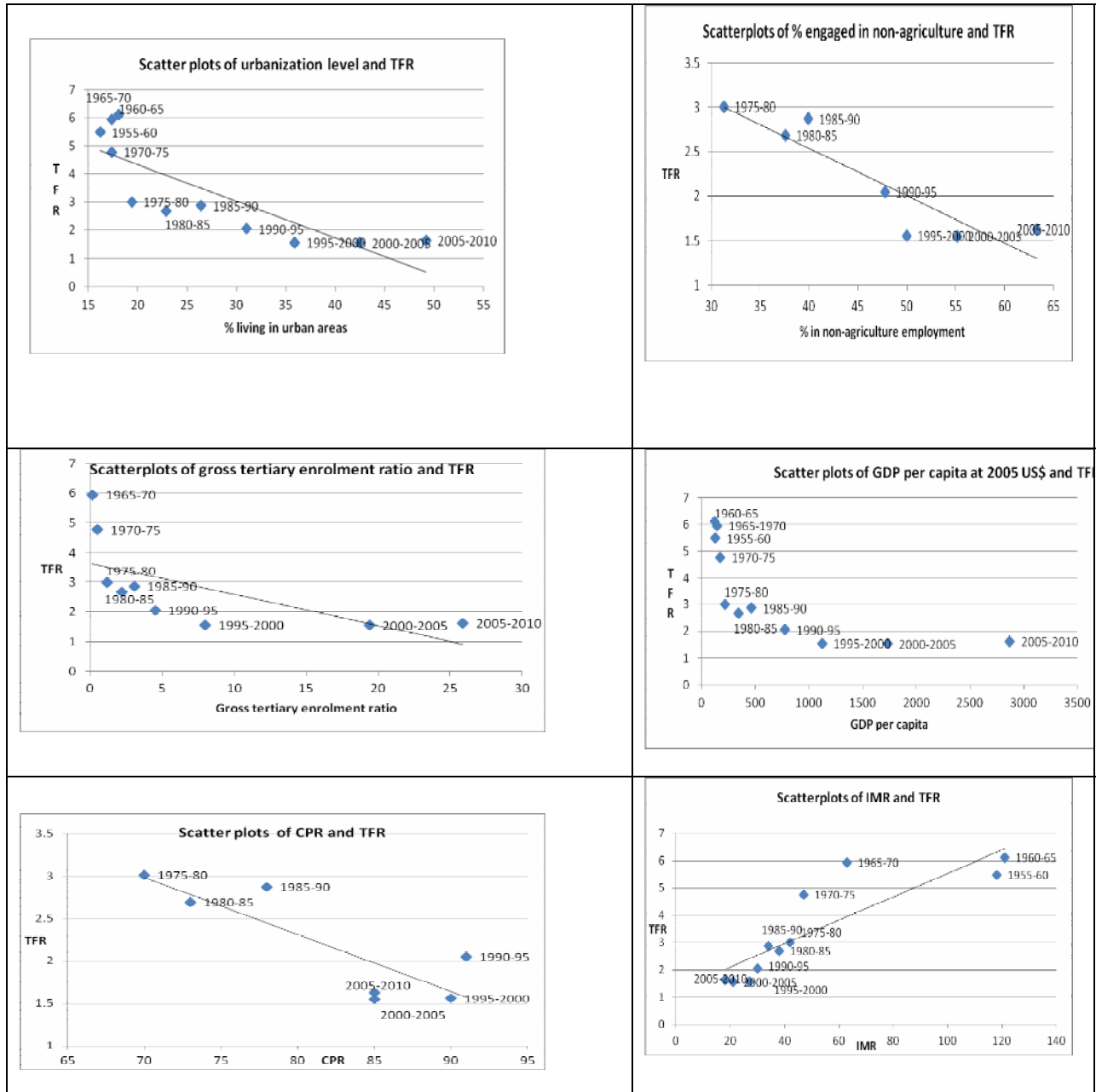
Gross enrolment in tertiary education in China was at a low level as at 1990s. Enrolment in tertiary education rocketed in the new millennium, indicating the importance placed on human capital development. It is to be noted that the fertility level had already declined to replacement level by mid 1990s, and this suggests that a strong family planning programme can bring about fertility reduction in low socioeconomic setting. Nevertheless, the negative association between education and fertility is also demonstrated in Figure 5. These findings imply that family planning programme and socioeconomic development have independent as well as combined effects on fertility reduction.

The per capita GDP in China was very low up until the 1990s. However, with rapid economic growth since the 1990s, the per capita GDP has risen at extraordinary pace, during the last one to two decades, as shown in Figure. However, it is to be mentioned that fertility had declined to a low level even when the majority of the population were poverty stricken, suggesting the important role of family planning programme in fertility reduction.

As mentioned above, China has one of the highest contraceptive prevalence rate in the world, and almost all were using a modern method. The high level of CPR contributed to continuing fertility decline.

In this analysis, infant mortality rate is the only variable that correlates positively with fertility. Infant mortality rate fell sharply from 120 per thousand births in the 1950s and 1960s to about 40 by 1980s and around 20 in recent years.

Figure 4: Association between socio-economic changes and fertility



Consequences of ultra low fertility in China

The rapid decline of fertility in China has its latent ramifications and socioeconomic problems. The main consequences are rapid ageing of the population, age dependency burden, imbalanced sex ratio at birth (probably due to sex selective abortion/female infanticide), changing family structure, gender equality, depopulation and labor shortage in the long run.

Based on UN medium projection, the population of China will peak at 1.45 billion in 2030, and will be reducing thereafter, to 1.08 billion by 2100. There is therefore a need for manpower planning to forestall any labour shortage that may arise.

The declining fertility has brought about age structural changes which are both beneficial and problematic. The proportion of the population aged below 15 had declined very substantially while the working age population has been increasing rapidly. This gives rise to the demographic dividend which China has capitalized to invest in human resource development as seen by the sharp rise in the enrolment ratio for higher education, and to channel more fund for development.

However, on the flip side, the number and proportion of older population will be rising rapidly such that the proportion each 65 and over will out-number those aged below 15 by 2030, when the older persons will make up 16.2% of the total population, as against 15.9% of the young (Figure 5). In numerical terms there will be 235 million and 331 million older persons aged 65 and over in 2030 and 2050 respectively. Figure 6 shows that there will be a decrease in population aged 40 and below between 2010 and 2050, and a sharp increase in the older population. The decrease is most pronounced for those in the prime working age. The old age dependency burden will increase from 11.3% in 2010 to 23.8% in 2030 and 39% by 2050. Social security and health care system need to be ready to cater to this rapidly increasing older population.

Since the 1990s when the TFR fell to below replacement fertility, the sex ratio at birth increased to 1.12 and further to 1.17 by 2010 (Figure 7). Traditionally the Chinese tend to have a strong preference for sons. Because abortion is legal in China, it is probable that the unusual sex ratio at birth could be the result of sex selective abortion and probably female infanticide as well.

The “One-child” family has also resulted in the breakdown of the family system. As noted by Hong (1987), it could drastically reduce the size and significance of the patrilineal lineage, promote the popularity of uxori-local marriage, and encourage women to make nontraditional career choices.

Figure 5: Age structural changes in China, 1950-2100

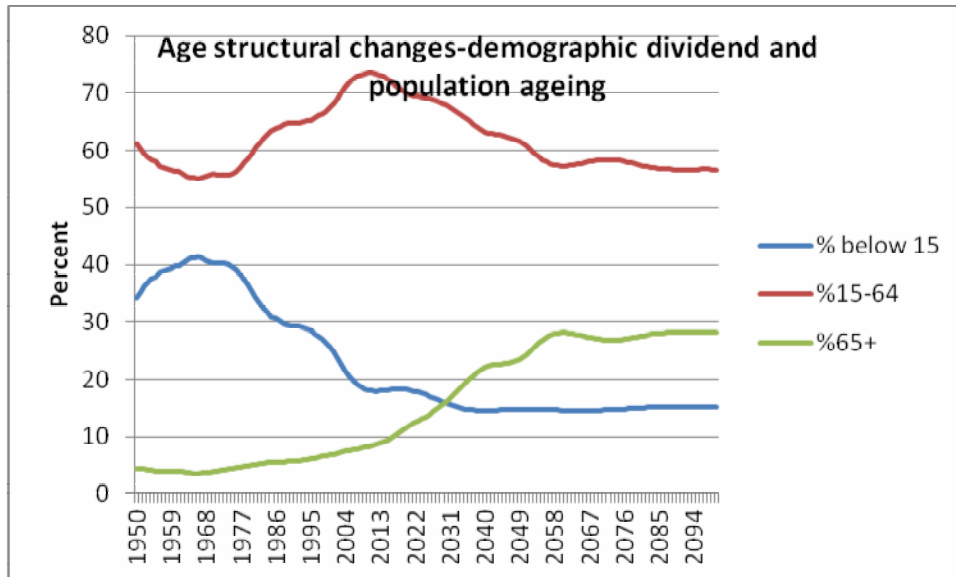


Figure 6: Population pyramid, China, 2010, 2050

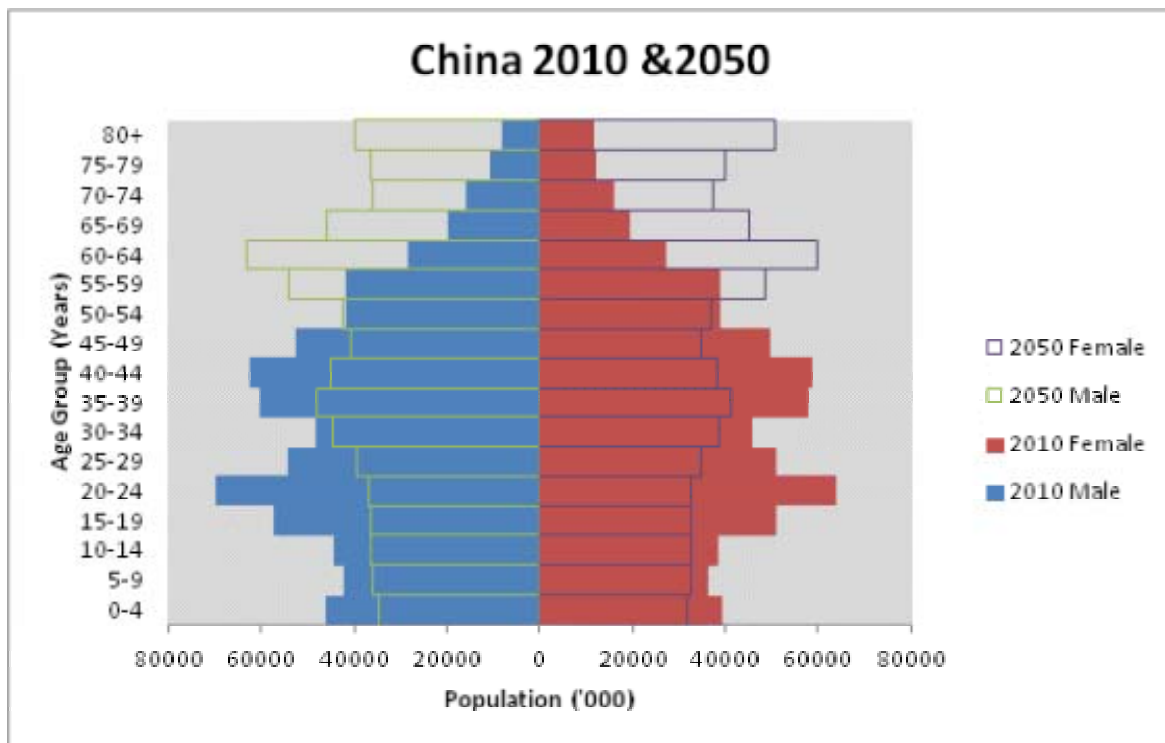
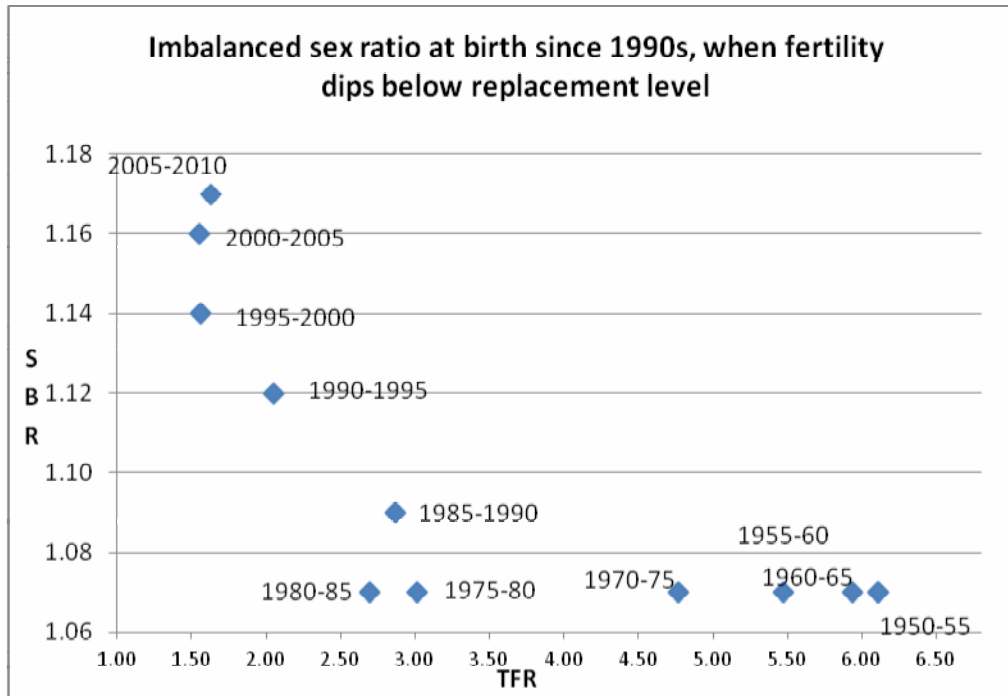


Figure 7: Sex ratio at birth



Discussion

The family planning policy, in particular the “One-child” policy has contributed to altering the demographic landscape of China and the world. Over a period of less than half a century, China managed to bring down its fertility level of about 6 children per woman to below replacement level fertility and now joins the league of the countries with the lowest low fertility. The effectiveness of the policy in birth control could be attributed to the commitment of top leaders at the central, provincial and local levels in supporting and enforcing its implementation, in a centrally planned economy. Despite variations in its implementation for the different sub-groups of the population, the policy is generally rather coercive with heavy penalty for non-compliance. Besides family planning programme, rapid socioeconomic development has also played an important role in contributing towards fertility decline.

With rapid population ageing, appropriate measures are needed to cater for their financial, health care and emotional needs. The social security system will have to be reviewed and improved. As many older people may not have children to provide the care and support, the state and the community must take over the task of caring and support. The large number of older people could be a vast reservoir of human resources to be tapped. With longer life expectancy, one policy option to engage the older people is to raise the retirement age.

In view of the unbalanced sex ratio at birth, probably due to sex selective abortion, there is a need to change the norms for son preference. Some studies have shown that daughters tend to be more filial and caring than the sons, and that there has been improvement in the child sex ratio in some parts of the country.

Fertility reduction has enabled China to capitalize on the demographic dividend to pursue rapid economic development and human resource development. From a poor country, China is now the second largest economy in the world. Concern over the adverse consequences of the protracted low fertility regime, some demographers have called for a review of the policy. In a paper presented at the IUSSP International Population Conference in August 2013, Zhigang Guo cautioned that China's population is aging faster than expected, and the fertility level is indeed too low and will begin to place enormous strains on the economy in the near future. He reckoned that there have been signs that top leaders of China are considering to adjust the tight birth control policy.

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