Induced Abortion in China: Levels, Trends and Its Role in Fertility Decline

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Content

Abstract

Using published and unpublished statistics in China this paper attempts to address some of the issues surrounding abortion in China: abortion levels and trends, its association with the development of the family planning program, and its role in China's fertility decline. Changes in China's abortion policies from the total ban in the early 1950s to successive legalization from mid-1950s leading quickly to a completely liberalized abortion policy are associated with both the changing socio-economic circumstances and the development of the population control policy. The birth control policy in the framework of the economic reform resulted in substantial increases in abortion, in addition to other family planning methods. The early 1980s and early 1990s witnessed the peak abortion levels associated with the abortion campaigns occurred at that time. With the attainment of low fertility and transition in China's family planning work, abortion level has fallen since the mid 1990s. However, the abortion contribution to fertility decline in China is only moderate both compared to the other two major components (marriage and contraception) and compared to that in many countries, unlike what many have envisioned.

Introduction

It is well established that China's family planning program has been decisive to the unprecedented fertility decline in the country. While China's family planning program represents one of the most comprehensive and sophisticated packages of policies and regulations, the major technical components involve delaying marriage (and childbearing), use of contraception and backup of contraceptive failure by abortion. The various national fertility surveys have demonstrably documented the trends in age at marriage and contraceptive prevalence and their significant impacts on fertility decline. Yet, not much is known about the levels and trends in induced abortion and its role in the fertility decline at the national level. Despite this, abortion in China has been a sensitive and controversial issue both within China and around the world regarding its relationship with China's family planning program and fertility decline. Most published China abortion studies only concentrated on local and small areas, largely cities; and extreme cases and biased reports are part and parcel of the debate. China abortion studies have been constrained largely from the unavailability of data as well as the government's discouragement.

Using a wealth of published and unpublished statistics from Ministry of Health, State Family Planning Commission and State Statistical Bureau of China, this paper thus attempts to address two issues surrounding abortion in China: First, what are the levels and trends in abortion in China, measured by a variety of abortion indicators? Second, how important is abortion in China's fertility decline? These issues will also be approached in an international perspective: what position the abortion incidence in China stands at the international panorama? How abortion changes as a component of demographic transition in general and comparing China with other countries in particular? However, this paper starts with an overview of abortion policies in China.

China's Abortion Policies

Abortion has been practiced in China since ancient time, simply because "Life necessitates it" (Tuan 1988: 98). The world's earliest recorded incident of an abortive technique is found in the royal archives of China nearly five thousand years ago (Bullough 2001). The well-known physician Sun Simiao (AD 581-682) in Tang Dynasty in his book Thousands of Important Gold Prescriptions (*Qian Jin Yao Fang*) quoted abortion prescriptions from Shen Nong's

Classics of Herbal Medicine (*Shen Nong Ben Cao Jin*), which is believed to be the earliest Chinese medical book complied by the Chinese emperor Shen Nong who reigned between 2732-2696 B.C. (Himes 1970; Tuan 1988). A later supplement to Sun Simiao's Thousands of Important Gold Prescriptions includes 30 volumes with 3 devoted to gynaecology, and the abortive prescriptions are directed towards pregnant women being unable to have a safe delivery because of health impedients or dystocia.

Chinese medical gynaecology was developed rapidly in Song Dynasty, leading to the clinical therapeutics. This is well manifested in a 24-volume book Encyclopedia of Effective Prescriptions for Women (*Fu Ren Da Quan Liang Fang*), written by the well-known Chinese medical gynaecologist Chen Ziming (1190-1270) in Southern Song Dynasty. Of particular significance is the inclusion of the heading Studies on Prescriptions of Contraception and Abortion （*Duan Chan Fang Lun*）. He revealingly states: "…women have difficulties at the time of childbirth. Some bear offspring unceasingly but desire to stop this; while some nuns and prostitutes do not want to conceive; therefore, prescriptions are written so that they may be prepared for use." (Himes 1970; Tuan 1988; Li 2000) Obviously the use of herbal contraception and abortion was extended to meet birth control demands that were previously undesirable, for example, abortion in the cases of too many children or non-marital pregnancies and pregnancy prevention. Also of importance is the proposed method for sex-selective conception: conception at what dates during the mensual cycle lead to a boy and otherwise lead to a girl.

Up to mid-Qing Dynasty, knowledge of herbal contraception and abortion was fairly widespread in parts of China, particularly in Jiangsu and Zhejiang areas. A famous scholar at that time Wang Shiduo (1814-1889), termed to be Chinese Malthus, advocated spread of prescriptions for contraception and abortion, among other things, to curb population growth (Li 2000). Many Chinese medicines have abortive effects, and are instructed with warnings for pregnant women to take at all times.

Induced abortion was prohibited in China in the first half of the 20th century. Chinese government first established induced abortion as a criminal offense in 1910 (Savage 1988), and continued to prohibit it into the early years of the establishment of the People's Republic of China. In 1950, Ministry of Health of China issued a regulation on prohibition of induced

abortion for women cadres in government and military departments, and in 1952, the regulation was extended to the whole country, which stipulated that those who did sterilization and induced abortion privately would be charged to be a crime of illegal abortion, and both the practitioner and the woman would be penalized by the people's court according to the law (Sun 1990). These regulations, however, were for the purpose of protection of maternal and child health to prohibit contraception, sterilization and induced abortion (Zhai 2000). At that time, induced abortion could only be applied to the circumstances when continued pregnancy is medically undesirable, when child spacing was too dense or breastfeeding was made difficult resulting from the additional pregnancy occurred when the previous child was under four months of age. In such cases, a joint application and consent of the couple and a certification of a physician is required before the abortion procedure. Abortion operations were to be performed as early as possible, preferably within the first month of pregnancy but at the latest not beyond the second month of pregnancy (United Nations 2001a).

However, the 1953 population census surprisingly reported a population figure of China much larger than what the government expected, then the abortion prohibiting regulation was relaxed when there was an initial consideration of a birth control policy (Zhai 2000). Also there were fairly strong demands for abortion and contraception among the cadres in government departments, workers in the factories and other urban residents who were suffering from difficulties and constraints on life, work, study and health due to frequent childbearing as a result of government banning on abortion and contraception, thus wishing the government to change the position (Meng and Ma 1999). In August 1953, the central government approved Contraceptive and Induced Abortion Procedures which specifically loosened conditions for induced abortion, mainly for women who already have four to six children (Tien 1987). Among other few situations, work or study that is too heavy can be justification of abortion application, but any request for the operation has to be first approved by the responsible department and certified by a medical organization. In April 1957, the Ministry of Health issued an announcement further removing the restrictions. That made induced abortion available to women upon request regardless her age and number of children (Cui 1981; Sun 1990). In Shanghai, a woman can obtain induced abortion free of charge in any hospital (Savage 1988). However, the liberalized regulations retained stipulations on timing, safety and frequency. Abortions were to be performed within the first-trimester of pregnancy, in the absence of other health impediments and when no abortion occurred in the

past 12 months. Women applying for abortion were to be advised of the health risks involved and provided contraceptive counseling to prevent future unintended pregnancies. The government stressed contraception to be the preventive measure while abortion to be the backup measure for contraceptive failure. A major consideration of the Ministry of Health's decision is to eliminate health consequences for women involved in illegal abortions. However, this was also a response to the birth control policy instruction of the Central government issued in 1955, which states that the Party favored a birth control policy and Party committees at all levels should publicize the policy among the cadres and the masses (except for the minority nationality areas) (Hu 1999). Despite no statistics, partially liberalized abortion policy in the late 1950s is believed to have a very limited impact on abortion level in China (Tien 1987; Scharping 2003).

In the aftermath of the Great Leap Forward and economic difficulties, the Chinese government reconsidered the population control policy in 1962 with stronger determination, and carried out family planning largely in the urban areas. The Ministry of Health further liberalized the policy in abortion and sterilization. Sterilization can be performed on either spouse of the couple in the absence of any surgical taboos. When a pregnant woman requests an abortion, in the absence of any surgical taboos, the operation should be performed as early as possible, preferably within three months of pregnancy. All the procedures are provided free of charge. In addition, there is a paid leave for 10-14 days. The Chinese-invented vacuum aspiration technique was first used in Shanghai in 1958, and practiced widely in the rest of China after 1964 (Faundes and Luukkainen 1974; Scharping 2003). Unfortunately, although the population policy still in place, the Cultural Revolution starting in 1966 shifted the attention away, and the government ceased all efforts to implement family planning.

The economic breakdown while exceedingly high population growth in the second half of the 1960s compelled the government to install two nationwide demographic programs: the massive migration from urban to rural areas and the resumption of the family planning program. Unprecedented in scale and thrust, the family planning program has been carried out consistently and vigorously throughout China since the early 1970s, and virtually all the restrictions imposed on obtaining induced abortion were removed. After 1979 China, upon launching the one-child policy, became least restrictive in induced abortion as to both the reason and gestation up until viability (Henshaw 1990; Rahman et al. 1998). Before the family planning policy, having an abortion is the woman's or couple's own decision to avoid

the unwanted birth according to their work, health or childbearing situation. After the family planning policy, however, there are additional interventions from the policy, and induced abortions occur when the pregnancies are either unwanted or not permitted by the policy. Abortion is not only free but also rewarded. There are variations across China, but generally the women who obtained abortion is rewarded with an extended paid leave and nutritional subsidies, depending on at what gestation of pregnancy the abortion is performed and whether she uses IUD or sterilization after the abortion.

The function of abortion has changed dramatically. Before the 1970s family planning program, abortions in China, similar to elsewhere, are purely backup measures for unwanted pregnancies on voluntary basis and are not taken as an approach for resolving the birth quota; however, since the late 1970s, population as integrated into the national economic planning, family planning methods including abortion serve an important role in achieving the demographic goals, which has not been seen elsewhere. Responding to this, second- or third-trimester abortions, which could be hardly approved in the earlier years, become more relevant. In many instances, induced abortion becomes largely obligatory measure without leave to personal choice. Abortions are applied not only to unauthorized pregnancies but also any non-marital pregnancies. However, the government's family planning norms consistently stress abortion to be only a remedial measure when there is a contraceptive failure, and repeated abortions and late-term abortions have grave health consequences and need to be avoided by the greatest extent possible. Despite these, induced abortions in China are largely the result of contraceptive failure (Wang et al. 1991; Qiao 2002).

Levels and Trends

Despite the fact that induced abortion was made legal in China in late 1950s through 1960s, approval for induced abortion was limited and strict (Henshaw 1990). Most pregnant women chose delivery rather than induced abortion and there were no restrictions on the numbers of births at that time.

Since the early 1970s, number of induced abortions and abortion rate in China were increasing with the implementation of the family planning policy, paralleling trends in other birth control methods. Policy adjustments and changes also produced fluctuations in number

and rate of induced abortion. Table 1 and Figures 1 and 2 document the levels and trends in induced abortion since China carried out the nation-wide family planning policy.

Table 1 Levels and trends in induced abortion in China

Year	Number of Births (million)	Number of Abortions (million)	Abortion Ratio	GAR	TAR	Actual CBR	Expected CBR	Actual TFR	Expected TFR
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1971	25.78	3.91	15.17	20.97	0.63	30.65	32.83	5.40	5.74
1972	25.66	4.81	18.76	25.26	0.76	29.77	32.51	4.93	5.35
1973	24.63	5.11	20.75	26.28	0.79	27.93	30.91	4.51	4.96
1974	22.35	4.98	22.31	25.11	0.75	24.82	27.79	4.16	4.60
1975	21.09	5.08	24.11	25.08	0.75	23.01	26.13	3.58	4.03
1976	18.53	4.74	25.60	22.88	0.69	19.91	22.87	3.26	3.67
1977	17.86	5.23	29.28	24.63	0.74	18.93	22.22	2.87	3.32
1978	17.45	5.39	30.90	24.74	0.74	18.25	21.64	2.75	3.21
1979	17.27	7.86	45.50	35.11	1.05	17.82	22.80	2.80	3.46
1980	17.87	9.53	53.32	40.99	1.23	18.21	24.21	2.32	3.08
1981	20.78	8.70	41.85	36.11	1.08	20.91	26.33	2.72	3.39
1982	22.47	12.42	55.27	49.99	1.50	22.28	30.07	2.62	3.58
1983	20.66	14.37	69.56	56.07	1.68	20.19	29.42	2.39	3.50
1984	20.63	8.89	43.09	33.69	1.01	19.90	25.60	2.29	2.96
1985	22.11	10.93	49.43	40.28	1.21	21.04	27.95	2.32	3.13
1986	23.93	11.58	48.39	41.51	1.25	22.43	29.63	2.36	3.18
1987	25.29	10.49	41.48	36.60	1.10	23.33	29.88	2.47	3.20
1988	24.64	12.68	51.44	43.11	1.29	22.37	30.34	2.17	3.04
1989	24.14	10.38	43.00	34.46	1.03	21.58	28.11	2.29	2.99
1990	23.91	13.49	56.44	43.81	1.31	21.06	29.58	2.24	3.15
1991	22.65	14.09	62.20	44.81	1.34	19.68	28.57	2.20	3.12
1992	21.25	12.58	59.22	39.33	1.18	18.24	26.14	2.00	2.81
1993	21.32	11.75	55.12	36.19	1.09	18.09	25.40	1.83	2.58
1994	21.10	9.47	44.88	28.82	0.86	17.70	23.57	1.81	2.41
1995	20.63	8.28	40.14	25.02	0.75	17.12	22.24	1.78	2.31
1996	20.67	8.83	42.73	26.35	0.79	16.98	22.40	1.81	2.38
1997	20.38	6.79	33.31	20.00	0.60	16.57	20.69	1.82	2.26
1998	19.91	7.38	37.08	21.52	0.65	16.03	20.46	1.82	2.31
1999	19.09	6.76	35.43	19.52	0.59	15.23	19.26	1.80	2.26

Note: Abortion Ratio=Number of Abortions/Number of Births*100; General Abortion rate=Number of Abortions/Number of Women aged 15-44 (not shown); Total Abortion Rate is the product of GAR and 30 (women's reproductive span from age 15-44).
Source: State Statistical Bureau (2000), Ministry of Health (2000), Qiao (2002), Coale and Chen (1987), the State Family Planning Commission (2001) and based on author's calculation.

It should be noted that, unlike other countries where abortion data in most cases are notoriously under-reported, abortion statistics in China tend to be inflated. There are two underlying reasons: First, the abortion data are records of operations performed by the health department, and the records are the basis according to which the health department get

reimbursed from the family planning department. Thus, both parties are careful and serious about the accuracy of the records. Because money is involved, the health department tends to exaggerate the figures (Tuan 1988). In the fieldwork county, the author was also told in an interview with the director of the county family planning commission that the county health bureau invariably over-reported the abortion figures for more financial subsidies from the family planning commission (Interview 2002). Second, the deceptive reporting of family planning statistics involves under-reporting of births while over-reporting of family planning operations including abortion. The purpose is overtly to gain political honours and monetary rewards (Freedman et al. 1988). However, in the 1990s, "when illegitimate pregnancies increased and abortions came to be treated as indicators of birth planning failure instead of success, over-reporting may have given way to a tendency to under-report" (Scharping 2003: 122). One of the major indicators measuring the family planning work achievements is the late-term abortion. The pressure is to not only reduce the total abortion operations, but also to avert, as completely as possible, the late-term abortion (Interview 2002). These suggest that the actual abortion incidence in China should lie in between the high figures from the health department and the low ones from the family planning commission. Abortion data presented in Table 1 are those published by the Ministry of Health, implying the possibility of marginally higher figures than the true levels.

There are no representative nationwide abortion figures before the 1970s. However, few scattered regional reports indicate the abortion ratio is well below 1% in the 1950s. Estimates by Scharping (2003: Table 7 on page 121) show that there is a steep rise in abortion cases during the second family planning campaign in the early 1960s. Estimated abortion cases were 0.4 million, with the abortion ratio to be 1.4%, in 1963; in the following two years, the numbers increased rapidly: total abortion cases increased to 1.8 million and abortion ratio 6.5% in 1965. The abortion ratio in Shanghai in 1964 was very high at 100%. No data are available for the second half of the 1960s, when the bookkeeping was broken down in the Cultural Revolution. Consistent figures resume from the early 1970s with the third family planning campaign. In 1971, the abortion number and ratio were already twice as high as those of 1965.

In Table 1, abortion levels and trends are represented by four measures: total number of abortions, abortion ratio (AR) per 100 live births, general abortion rate (GAR) per 1000 women of reproductive ages, and total abortion rate (TAR) per woman. Number of induced

abortions was generally around 5 million before 1979, with the AR below 30%, GAR around 25 ‰ or lower and TAR between 0.7-0.9. This is the period of later-longer-fewer family planning policy, the policy set number of children is ideally 2-3 which in fact is the desired fertility at that time. Thus coercion is hardly involved, and contraceptive use and abortion practice increased rapidly when the nationwide network of family planning was established covering the vast majority of the population, and family planning activities were monitored all the way down from the Central government to the grass-roots levels through a highly organized hierarchical administrative system. Total fertility rate dropped by 50% in only 7 years, from 5.4 in 1971 to 2.7 in 1978. The majority of Chinese fertility decline occurred in this period when abortion levels were fairly low.

By the late 1970s, the baby boom cohort born in the early 1960s started to enter the childbearing ages. With the substantial increase in women of reproductive ages, vast population growth is inevitable unless a more hastily braking policy is implemented immediately. In 1979, Chinese government launched the one-child family planning campaign. A set of stringent regulations established the childbearing pattern with respect to whether and when to have a child, whether and what contraceptive method is used. Women who have one child must have IUD inserted, women who have two or more children must be sterilized, and women with unauthorized pregnancies must abort their pregnancies. The extent to which these mandatory measures were enforced reached a high tide in 1983. This is manifested in the rocketing number of abortions in the early 1980s. The number of abortions doubled and tripled during 1979 and 1983. More than 14 million abortions occurred in 1983, the magnitude of which is comparable to the 1980 Australian total population (United Nations 2001: 116). The other abortion indicators were also peaked: AR 70%, GAR 56‰ and TAR 1.7 (which could mean that a woman would abort 1.7 children in her lifetime holding the abortion pattern in 1983). However, fertility was only reduced by a very small magnitude, and throughout the 1980s, fertility was fluctuating well over the replacement level.

The massive resistance within China and increasing criticism from outside China (particularly from the United States) prompted modifications of the one-child policy. No. 7 Document of the Central government in 1984 adjusted the one-child policy, to be known as “opening up the small hole and closing the big one” (Peng 1997). Greater flexibility was applied to the circumstances of authorizing the second birth, and coercive and commanding

actions in enforcing the family planning policy were prohibited. As a result, slight abortion fluctuations were observed in the next few years but still stood at fairly high level with AR 40-50%, GAR 30-40‰ and TAR 1-1.3. The policy adjustment revived higher-order births, and again the government issued No. 13 Document in 1986 closing some of the loopholes and tightening up the policy (Hardee-Cleaveland and Banister 1988).

In view of political liberalization and social disturbance in the late 1980s, Chinese government tightened widely ideological and social control, and in 1991, the Central government issued a decision on strengthening family planning work to strictly control population growth, and this was the second round of contraction and coercive policy implementation, producing abortion level similar to that of the early 1980s. This is also believed to be the major force that had driven China's fertility below replacement in early 1990s. The heightened efforts in population control were typically characterized by the topmost political leader taking personal responsibility for the family planning performance within his jurisdiction（*Di Yi Ba Shou Fu Zong Ze*） and a "one-vote veto" system （*Yi Piao Fo Jue Zhi*）.

Beginning in 1993, China started to rethink the nature of family planning, proposing "grasp the family planning work both tight and well" (Peng 1997), and the 1994 Cairo Conference on Population and Development and 1995 Beijing World Conference on Women have particularly influenced China's family planning, subsequently pilot quality of care in family planning was carried out in East China, which has gradually been expanded from the initial 6 counties to 660 counties nation-wide (Zhang et al. 1996; Zhang 2000; Zhao 2002). At the same time, the rapid economic development and transition to market economy have also undermined traditional fertility norms. Under these circumstances, abortion rate declined in the late 1990s. GAR and TAR fell to around 20‰ and 0.6 respectively in the last three years, lower than the levels in the early 1970s when the family planning program started.

China's abortion level stood below the world average in the late 1990s. Table 2 compares China to a variety of countries in the world. Eastern European countries have the highest level of abortion, where an "abortion culture" prevails and women mainly rely on abortion to control fertility (Henshaw et al. 1999). Despite marked declines in 1990s with the availability of the modern contraceptives, their abortion levels are still at the top of the world. In contrast,

Western Europe enjoys the world's lowest level of abortion, which is only about one-fifth of the Eastern European level. The vast developing regions stand in the middle.

Table 2 Comparison between China and the selected countries, various abortion measures

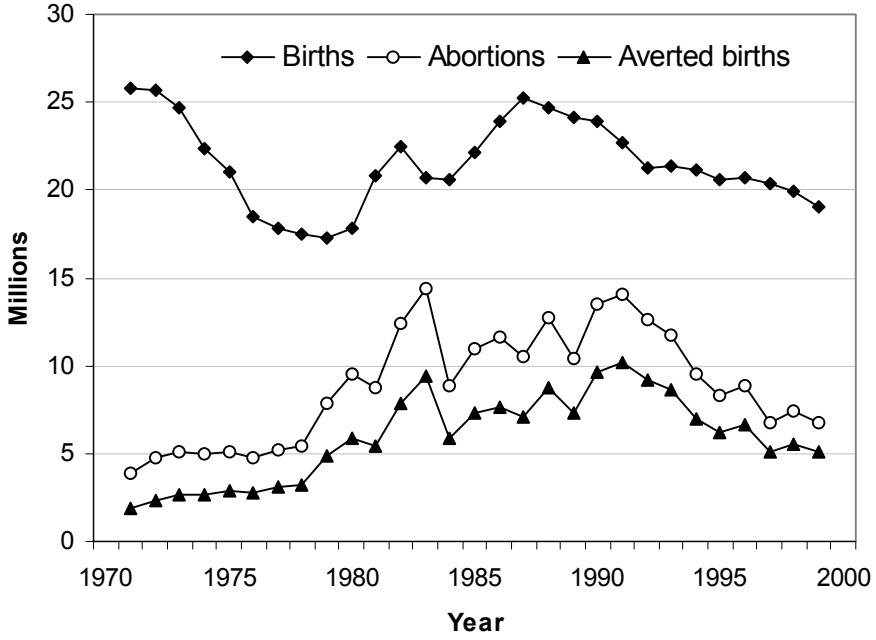
County	Year	Abortion Ratio (AR)	General Abortion Rate (GAR)	Total Abortion Rate (TAR)
India	1995-96	2.1	2.7	0.08
South Africa	1997	2.4	2.7	0.08
Bangladesh	1995-96	3.1	3.8	0.11
Spain	1996	12.6	5.7	0.17
Netherlands	1996	10.6	6.5	0.20
Belgium	1996	11.2	6.8	0.21
Germany	1996	14.1	7.6	0.23
UK	1996	14.7	10.0	0.31
Japan	1995	22.4	13.4	0.40
Singapore	1996	22.8	15.9	0.48
Sweden	1996	25.2	18.7	0.56
Australia	1995-96	26.4	22.2	0.57
South Korea	1996	24.6	19.6	0.59
USA	1996	22.9	25.9	0.69
Mongolia	1996	18.2	25.9	0.78
China	**1996**	**42.7**	**26.4**	**0.79**
Armenia	1996	39.4	35.4	1.06
Hungary	1996	42.1	34.7	1.07
Latvia	1996	53.9	44.1	1.33
Bulgaria	1996	55.2	51.3	1.55
Yugoslavia	1993	45.8	54.6	1.64
Ukraine	1996	57.6	57.2	1.72
Cuba	1996	58.6	77.7	2.33
Romania	1996	63.0	78.0	2.34
Vietnam	1996	43.7	83.3	2.50
Russia	1996	62.6	68.4	2.56

Source: The China figures are from Table 1, figures for other countries are from AGI (1999), Appendix Table 4. Abortion statistics in India, Bangladesh and South Africa "do not include illegal abortions, which are thought to constitute the majority of procedures. " (AGI 1999: 48)

The world average GAR was 35‰ and TAR 1.05 in 1999 (AGI 1999). China's 1999 abortion level was lower by a fairly large magnitude. Country differences are striking. In 1996, the highest TAR occurred in Russia and Vietnam where women would abort 2.5 children in their lifetime, while TAR was near nil in India and South Africa (however, abortion statistics in these two countries are rather incomplete). The peak TAR 1.7 in China in 1983 is actually not only lower than the current highest level in the world but also far below the historical record in the high abortion countries. Russia, Yugoslavia and Romania, for example, recorded TAR

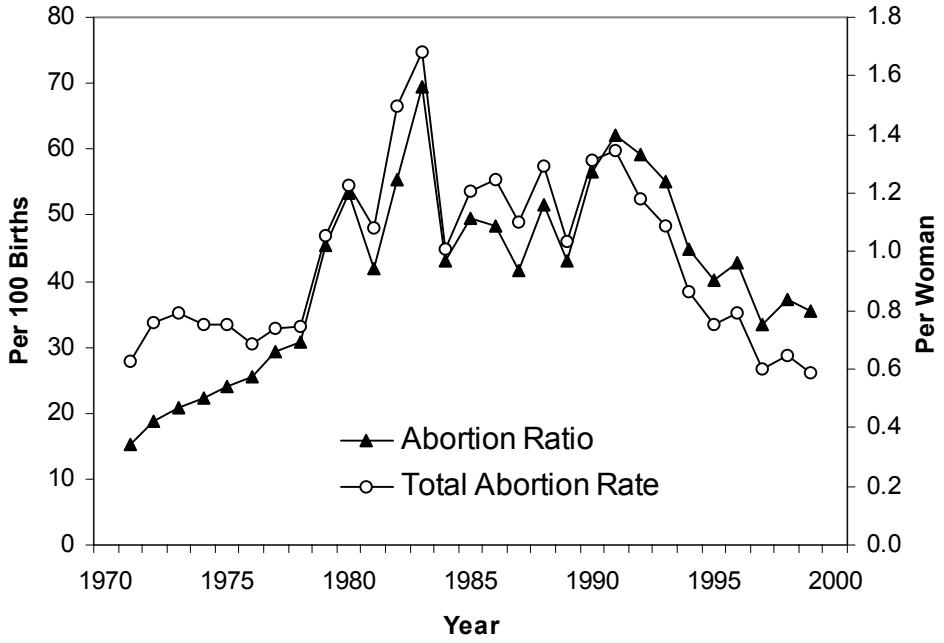
of 5-7 in early 1960s, while TAR in Japan in the late 1950s was also as high as 4 (Frejka 1983). Eastern European countries still experienced TAR of 3-4 in 1970s (AGI 1999). Abortion rate was also climbing quickly in South Korea in 1970s when rapid fertility decline occurred, where TAR as of the early 1980s stood at nearly 3 (Bongaarts and Westoff 2000). It is clear that abortion as a means of fertility control is widely practiced around the world, and it did play a crucial role in fertility decline in some of the rapid fertility decline countries. Experience worldwide shows that change in fertility desire and fertility decline frequently outpace the societal response and the availability and provision of the effective methods to achieve the childbearing goals, and in some countries the most rapid fertility decline and the most rapid abortion increase occurred simultaneously. Recently worldwide abortion rates have fallen fairly dramatically as a result of the increasing availability of the modern contraceptive methods (Henshaw et al. 1999).

Figure 1 Trends in number of births and abortions, China, 1971-1999



Note: Averted births=Abortions*0.4*(1+u), where u is contraceptive prevalence rate (see Annex).
Source: Table 1.

Figure 2 Trends in abortion ratio and total abortion rate, China, 1971-1999



Source: Table 1.

Contribution of Induced Abortion to Fertility Decline

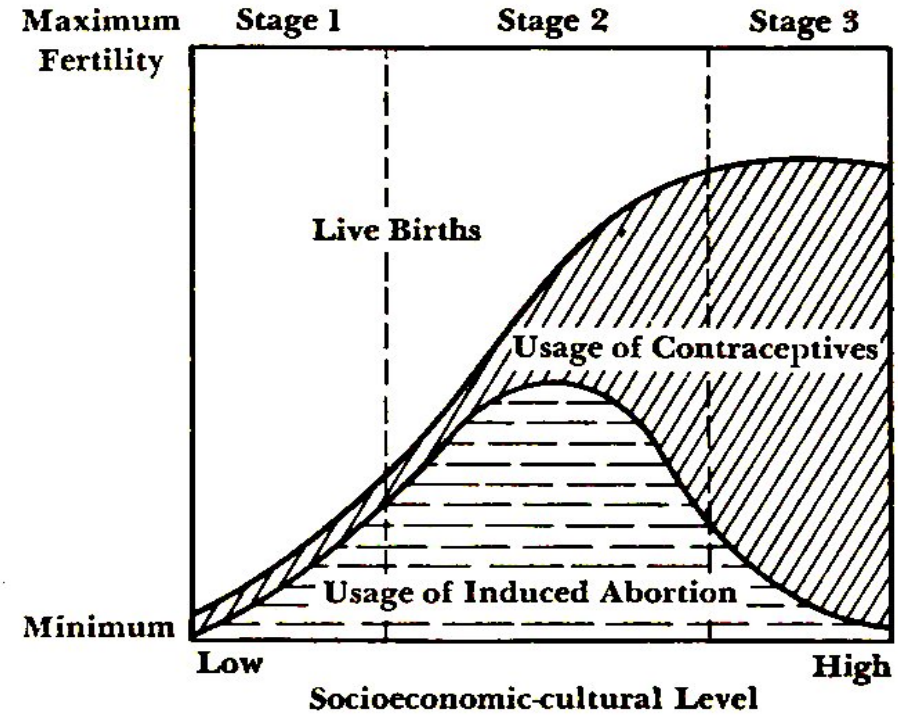
It is widely argued that forced abortion policy is an important component of China's family planning program, and China has relied heavily on induced abortion to control fertility (Feng et al. 1983; Banister 1987; Aird 1990; Tien et al. 1992; Wang et al. 1998; AGI 1999). Despite the coerciveness, the role of induced abortion in China's fertility decline is far less remarkable than that in many of the developed and developing countries. This subsection examines the trends and patterns in abortion and contraception in relation to fertility transition in China and puts Chinese experience in an international perspective.

Induced Abortion and Fertility Transition

Historically and socially contraception and abortion are the two major determinants of fertility decline. The transition of fertility from uncontrolled to replacement level is seen with varied combinations of contraceptive use and abortion rate. Requena (1965, 1970 see Moore 1971; Potts 1981) proposed a diagram picturing the changing relationship between abortion and contraception in a population with declining fertility. While the fertility transition normally follows an S-shaped curve declining from high to low levels, abortion rate is an

inverted U pattern (Figure 3). Over the three stages of fertility transition through which a society may pass, fertility control is normally infrequent in stage 1, as couples have high fertility desire, thus at little risk of unintended pregnancies. With development, there is a growing gap between actual and desired family size when child survival improves and fertility demand decline. As development proceeds, the desire for reproductive change becomes sufficiently large and widespread that a few innovators adopt contraception, a process that spreads rapidly through diffusion and social interaction (Bongaarts 2002). Thus, as contraceptive prevalence rises and fertility starts to fall, an increasing proportion of couples want no more children, and as a result, the exposure to the risk of unintended pregnancies also increase. In the early and middle stages of fertility transition, use of effective methods of contraception by couples who want to limit or delay childbearing is still far from sustained and universal largely because of the unavailability of the methods, thus induced abortion rises as well as unwanted births (Marston and Cleland 2003). Thus fertility control is exercised with primary reliance on abortion in stage 2 despite rising contraceptive use. With contraceptive improvement and increasing use of modern contraceptives while fertility decreasing toward replacement level, potential demand for abortion and its incidence fall. Thus fertility control shifts its major reliance onto contraception in stage 3. However, when desired fertility is low, potential exposure to unwanted pregnancies becomes prolonged even women are highly contraceptive. Unwanted pregnancies are absent only in societies of "perfect contraception", societies in which all women who want no more children use 100% effective contraception at all times at risk. Such a perfect state has never been and can never be achieved, a residual demand for abortion always exists, sometimes fairly substantial. More often than not, not all women who want no more children practice contraception and those who do often rely on methods that are far less than 100% effective. The magnitude of abortion in post-transitional populations varies considerably according to their levels of contraceptive use and mix of contraceptive methods. Although both historical and contemporary fertility transitions have generally confirmed to the above-described pattern of the changing relationship between induced abortion and contraception, the extent to which abortion versus contraception inhibited fertility varied substantially across countries.

Figure 3 Changing patterns of induced abortion and contraception during the fertility transition



Source: Moore, Emily C. and M.A., M.S. 1971. Induced Abortion and Contraception: Sociological Aspects, pp. 131-155, in Newman, Sidney H., Mildred B. Beck and Sarah Lewit (eds.) *Abortion, Obtained and Denied: Research Approaches.* New York: The Population Council. Reprinted with the permission of the Population Council.

Despite the fact that abortion data are notoriously under-reported in most countries in the world, whose role in fertility decline is thus difficult to assess in some cases, countries with below-replacement fertility in the late 1990s can be broadly classified into three groups according to the importance of induced abortion in their fertility decline: The first group refers to the western industrialized countries where fertility transition took place in the 19th century and the early 20th century. Fertility decline in these countries is gradual and cumulative responding to the social and economic changes. The major contributions to fertility decline are the rising age at marriage and proportion not marrying and using primarily traditional contraceptive methods (as the modern methods were largely unavailable at that time). As fertility transition had been largely completed by the time legalization of abortion took place around the mid-1950s, illegal abortions have played some role in fertility decline, but legal abortions have played important role in sustaining low fertility. These countries represented the classical demographic transition model.

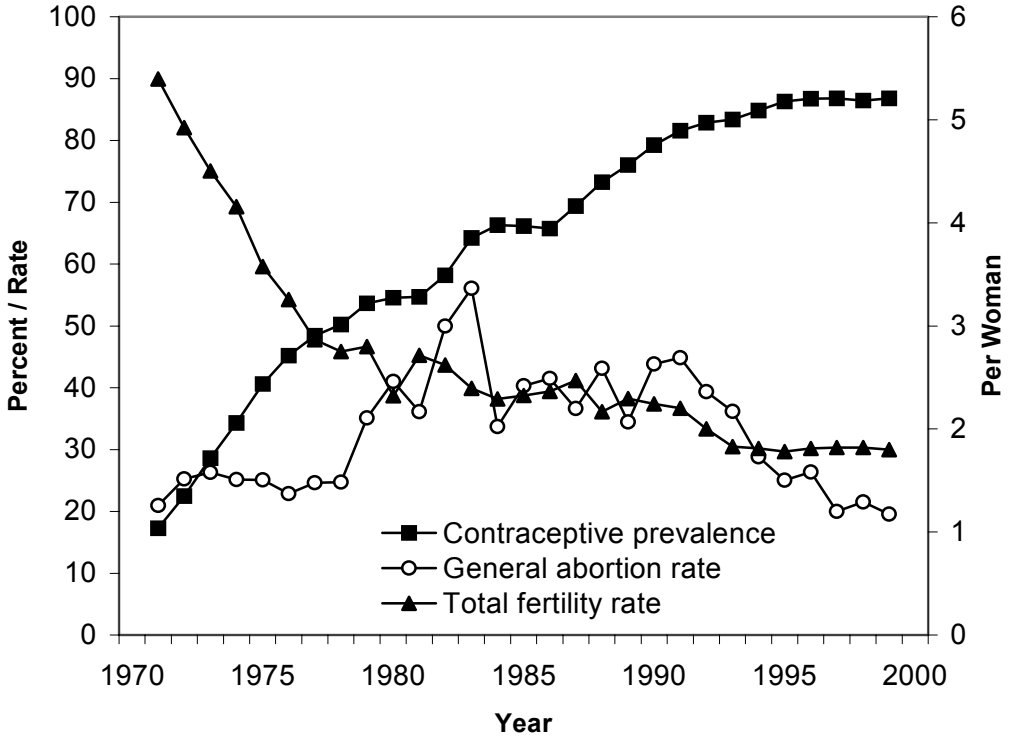
The second group of countries is also the developed areas including USSR and other Eastern European countries and Japan. Fertility transition in these countries is largely a process occurred in the early to mid-20th century within a relatively short period of time. Abortion has played a major and decisive role in the rapid fertility decline. Legalization of abortion involved obviously demographic purpose, and throughout the fertility transition, abortion rates remain to be the highest in the world. Despite the increasing replacement of abortion by contraception, abortions are still more important than contraception in sustaining low fertility. Finally, the third group comprises the populations mainly in East Asia and South-East Asia, such as China, South Korea, Taiwan, Thailand and Cuba. Fertility transition occurred in these countries in the 1960s and replacement fertility attained in the late 1980s and early 1990s. Fertility decline has been very rapid under the combined forces of national family planning programs and socio-economic development. While fertility decline was largely due to rising age at marriage and modern contraceptive use, induced abortion played a roughly equally or moderately important role. Unlike the first two group of countries where either technology or policy were limiting the availability of the modern methods of contraception, in the third group of the countries national family planning programs were promoting wide use of modern contraceptive methods, and abortion was legalized before or in the early stages of fertility transition. In some of these countries, contraceptive prevalence has reached the highest level in the world, the role of abortion in sustaining low fertility is considerably reduced. Across these three groups, abortion has been contributing most importantly in the second group, moderately importantly in the third group, and least importantly in the first group to fertility transition and sustained low fertility.

Tietze and Bongaarts (1975) developed some simulation models from which some important conclusions were drawn regarding the incidence of abortion in fertility transition. “Regardless of its legal status, abortion is used with similar frequency in all countries that have similar patterns of marriage, contraception and fertility.” (pp.119) And “it is unlikely that any population has ever attained a low level of fertility (TFR=2.2 or less) without the use of induced abortion, legal or illegal.” (pp.119) It is amazing from their calculations that even under the best conditions of contraception, fertility control is far less perfect. Assuming 95% of the couples are limiting family size after two births with contraceptive effectiveness being 95% (abortion is used after contraceptive failure), total abortion rate would be 0.92 when total fertility rate is 1.85 (pp.116, Table 3). The implication is that with the current contraceptive technology, universal and effective use of contraception will reduce, but will

not altogether remove the need for abortion. Induced abortion continues to play a critical role in family planning and fertility reduction in the populations in their early or middle stage of fertility transition.

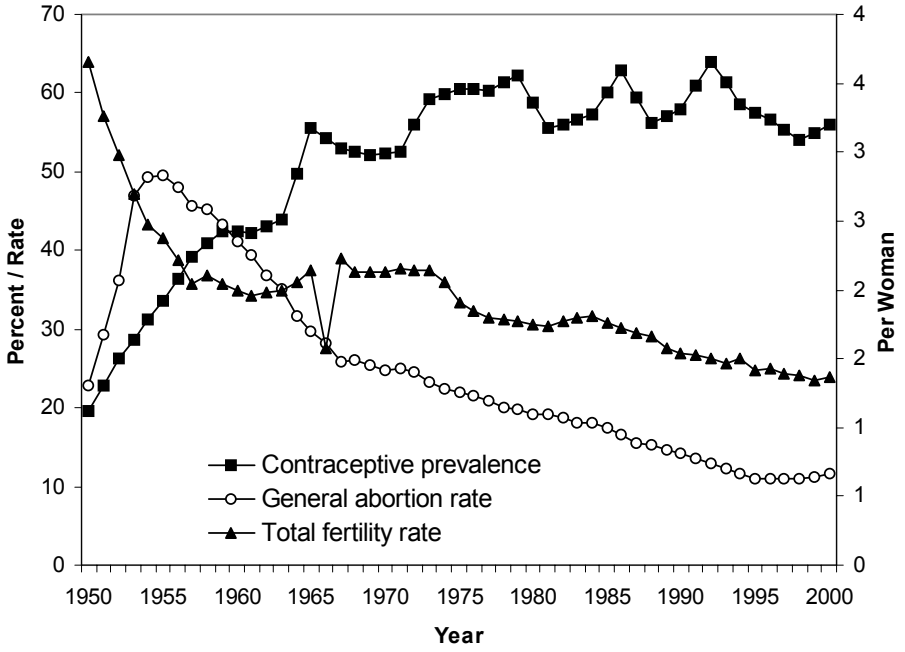
Although available statistics cannot isolate quantitatively the role of induced abortion as compared to other fertility-reducing factors for most of the countries, an attempt is made to quantify the abortion impact in fertility decline in China with contrast to two neighboring countries Japan and South Korea. Figures 4 to 6 display trends in fertility and its two major determinants, abortion and contraception, in these three countries. There are some similarities as well as dissimilarities between these three countries in their reproductive trends. The general trends in fertility, abortion and contraceptive use are broadly similar: in the initial stage of fertility decline, abortion and contraceptive use increased simultaneously; while at later stages of higher and universal contraceptive use, induced abortion declined when fertility approached the replacement level. However, differences are substantial primarily regarding the role of abortion.

Figure 4 Trends in abortion rate, contraceptive prevalence and total fertility rate, China, 1971-1999



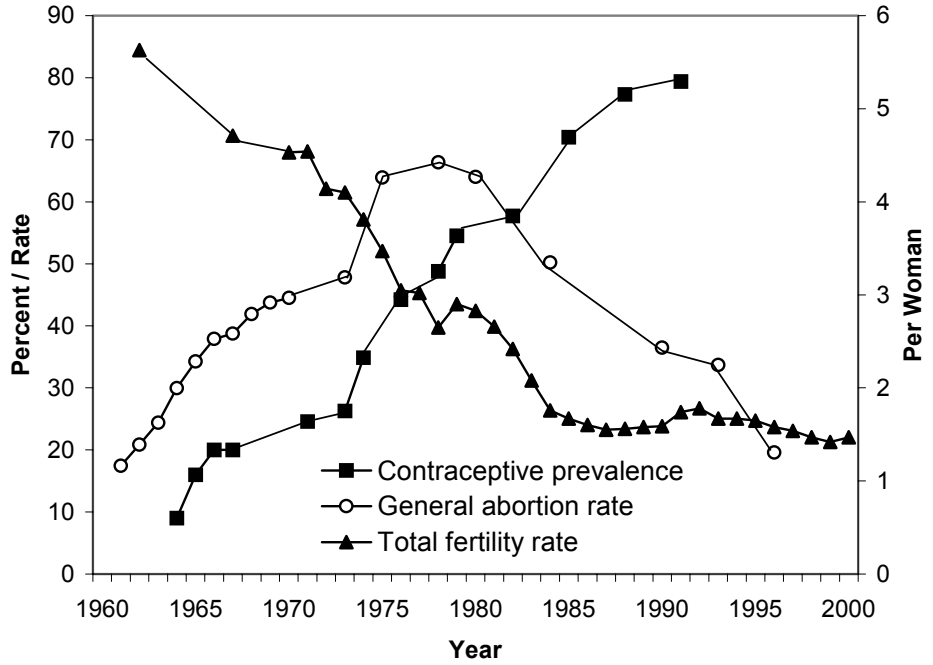
Source: abortion and fertility rates come from Table 1, contraceptive use from 1988 Two-Per-Thousand Fertility Survey and China Family Planning Yearbook for various years.

Figure 5 Trends in abortion rate, contraceptive prevalence and total fertility rate, Japan, 1950-2000



Source: Latest Demographic Statistics. National Institute of Population and Social Security Research. http://www.ipss.go.jp/English/S_D_I/Indip.html. Date assessed: 6 August 2003.

Figure 6 Trends in abortion rate, contraceptive prevalence and total fertility rate, South Korea, 1960-2000



Source: Korean National Statistical Office, http://www.nso.go.kr/eng/index.shtml. Date assessed: 6 August 2003; United Nations. 1999. Levels and Trends of Contraceptive Use as Assessed in 1988. ESA/P/WP.155.

South Korea remains to be a most striking example of concurrent rise of abortion and contraception while rapid fertility decline. Omran (1971: 481) commented that "when developing societies are highly motivated to accelerate their transition from high to low fertility, induced abortion becomes such a popular method of fertility control that it becomes a kind of epidemic". Despite the restrictive abortion law before 1973, the incidence of abortion rose rapidly along with the increasing use of modern contraception during the 1960s at the initial stage of the national family planning program. Most of the people were unaware of the illegality (the law was not enforced), and abortion procedures were widely available at both the private clinics and larger institutions. Many social commentators call Korea an "abortion paradise" (Tedesco 1996) because abortion is easily available and is performed hygienically and efficiently at relatively low cost. There were concerns expressed by the social scientists and medical doctors in the late 1950s with the potential consequences of rapid population growth in the wake of post-war economic difficulties. At a time of social change, age at marriage and educational level were rising, and there was an increasing pressure to control family size especially in overcrowded urban areas (van der Tak 1974). As the small-family norm spread while contraception had not become widely available and acceptable, total abortion rate rose precipitously from 0.5 abortions per woman in the early 1960s to nearly 3 in the early 1980s. Many women in South Korea use abortion not as a backup for contraceptive failure but as a primary method of birth control, as repeated abortions are common and high. The recent two decades have seen marked replacement effects: as contraceptive use increased further to higher than 50%, abortion began to decline, and by the late 1990s abortion rate dropped back to its initial level. During this entire period of fertility transition, the total fertility rate dropped from over 6 to 1.6 births per woman. Abortion averted fertility rose from 0.6 births per woman in the mid-1960s to a peak of 1.4 in the late 1970s, and then dropped again to 0.6 in the mid-1990s.

While abortions had been fairly widely used in South Korea when the abortion law was still restrictive, the dramatic and extensive resort to abortions in Japan were largely facilitated by liberalization of abortion law in 1948. In view of rapidly rising numbers of illegal abortions and also for eugenic purpose, Japan moved from strict prohibition of abortion to "beyond doubt, the most permissive abortion system in the world" by 1952 (van der Tak 1974: 30). Liberalized abortion was also expected to accelerate the desired process of fertility decline.

Liberalization of abortion law in Japan was supported by the widespread social changes, sudden decrease in per capita income after World War Two and a rapid postwar mortality decline that created high natural increase, which left the Japanese people worried for the first time about overpopulation (Preston 1986). As a response, deferred marriage and heavy reliance on induced abortion were adopted to control fertility. As a result, Japanese fertility dropped drastically in just one decade to the replacement level in the late 1950s although use of modern contraceptive methods such as IUD and pill was largely non-existent. In fact, it seems quite illogical and puzzling that Japanese policies encourage abortion over contraception. Plastic IUDs was approved in Japan in 1974 and the safer and more effective copper IUDs were not approved until 1999 (Norgren 2001). Japan's long-standing pill ban was extremely unusual: by 1999, Japan was the only member of the United Nations that had not approved the pill for contraceptive use (Norgren 2001). As a result, the primary method of contraception in Japan is condom. As of 1998, condom accounted for 78% of all the contraceptive users (United Nations 1999). Compared to the IUD and the pill, the failure rate of condoms is quite high.

Japan provides an example of a fertility transition model in which the intensity of motivation to control fertility in the shortest time possible has reached extremes. In the 1950s, fertility decline and abortion rise in Japan was the fastest ever exhibited by an entire nation. While total fertility rate dropped from 4.32 in 1949 to 2.04 in 1959, total abortion rate rose from 0.41 in 1949 to a peak of 1.73 in 1955 and dropped slightly to 1.51 in 1959 according to the official registration system. However, according to Japanese scholars Muramatsu and Koya, the registration was far less complete in abortion statistics. Muramatsu (1973) summarized a range of analyses by Japanese researchers to work out estimates of the real incidence of abortion, which shows that the estimated incidence was about 1.5 to 3 times as high as the reported incidence. Muramatsu (1970, 1978 see Tietze and Henshaw 1986) assumed that two out of every three legal abortions were not reported by physicians, apparently for tax reasons. According to his estimates, as shown in Table 3, the actual abortion numbers should be 2.4 to 3.8 times the reported statistics over 1955-1975. While official TAR stood at the highest 1.7 in 1955 and declined thereafter, estimated TAR by Muramatsu exceeded 4.0 in the late 1950s and declined moderately to 2.6 in 1975. When comparing the last two column of Table 3, abortion averted TFRs based on Muramatsu's estimates are largely at similar levels of the actual TFRs. Thus, abortion is accredited with roughly 50% reduction in the anticipated

fertility. The role of abortion in Japanese fertility decline is even larger based on estimates by Koya (cited in Omran 1976), who goes as far as attributing 80% of the reduction to abortion and 20% to contraception.

Table 3 Abortion and fertility in Japan, 1955-1975

Year	Official statistics	Muramatsu's estimates	Ratio	Total abortion rate		Averted TFR		Actual TFR
				Official	Muramatsu's	Official	Muramatsu's	
	(1)	(2)	(3)=(2)/(1)	(4)	(5)	(6)	(7)	(8)
1955	1170	2790	2.38	1.73	4.13	0.92	2.20	2.37
1960	1063	3150	2.96	1.44	4.27	0.82	2.43	2.00
1965	843	2750	3.26	1.04	3.39	0.65	2.11	2.14
1970	732	2780	3.80	0.87	3.30	0.53	2.01	2.13
1975	672	2250	3.35	0.77	2.58	0.49	1.65	1.91

Note: abortion numbers in columns (1) and (2) are in thousands; Total fertility rate (TFR) or total abortion rate (TAR) are expressed as number of births or abortions per woman.
Source: Columns (1) and (2) come from Tietze and Henshaw. 1986. *Induced Abortion: A World Review 1986*. The Alan Guttmacher Institute. Column (8) is from Latest Demographic Statistics. National Institute of Population and Social Security Research. http://www.ipss.go.jp/English/S_D_I/Indip.html. Date assessed: 6 August 2003. All other columns are author's own calculations.

Davis (1963) argues that widespread practice of abortion (as well as delayed marriage, increasing contraception and out-migration) was part of a "multi-phasic response". "It is a response to social and economic situations arising in country after country at a particular time in the process of modernization."(Davis 1963: 346) Extensive use of abortion was not peculiarly Japanese, arising out of either ancient tradition in Tokugawa times or the absence of Christian ideology. Such a response was also typical of the most advanced countries of Western Europe. However, the role of abortion was more marked and visible in Japan due to the legislation and wide availability. Much more important in Japan than in the West at a similar stage of development and to the achievement of smaller family size, abortion can be considered one cornerstone of the Japanese postwar "demographic miracle" and "economic miracle" (van der Tak 1974).

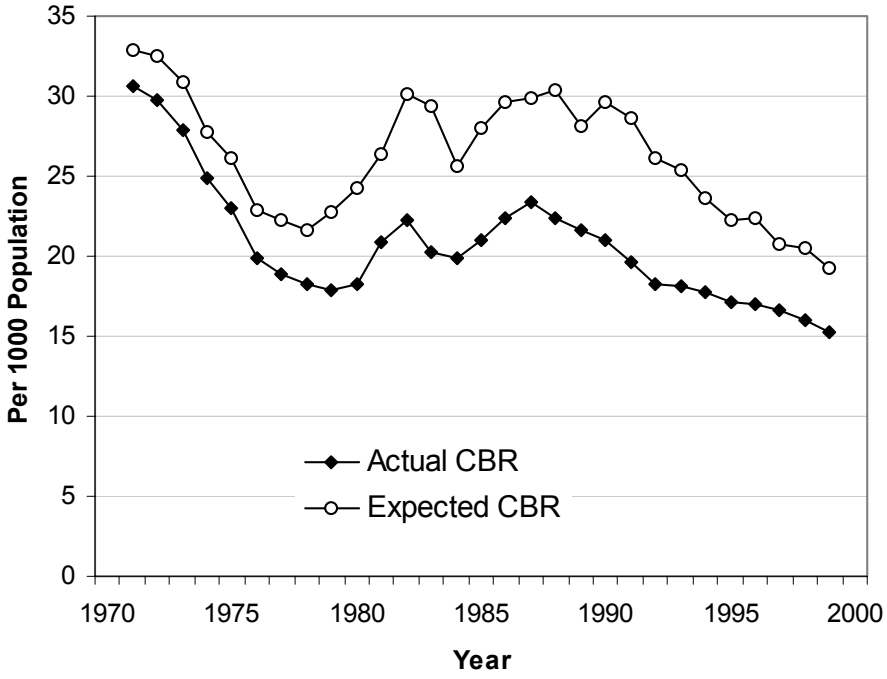
There was a similar response in China soon after the Communist Party took power and launched the modernization drive while rapidly falling mortality created unusually high natural increase rate of population. There were some initial demands for abortion in the early 1950s when abortion was highly restrictive. And in the context of socialism as influenced strongly by the Soviet Union, abortion was theoretically favored as a socialist approach to the liberation of women (Stycos 1989). At the same time, Chinese government and policy makers were concerned with the potential consequences of rapid population growth particularly in the wake of economic difficulties resulting largely from political and policy failure. All these

factors contributed to legalization of abortion, and finally with the scale and thrust of the national family planning program abortion becomes widely practiced for limiting and spacing childbearing voluntarily or involuntarily and backing up the contraceptive failure.

China's family planning program stressed contraception rather than induced abortion, and the latter was repeatedly described as a "remedial measure". However, at the initial stages of the one-child policy when practical contradictions persist between the country's demographic goals and couple's reproductive aspirations, extensive resort to induced abortion as well as effective contraceptive methods are demonstrably necessitated. Use of abortion and sterilization is particularly associated with the birth quota system and additionally in the 1990s with the "one-vote veto" system. The pressure to abort and persuaded abortion are evident in much of China particularly in the rural areas, while in urban areas abortions are increasingly self-motivated practices.

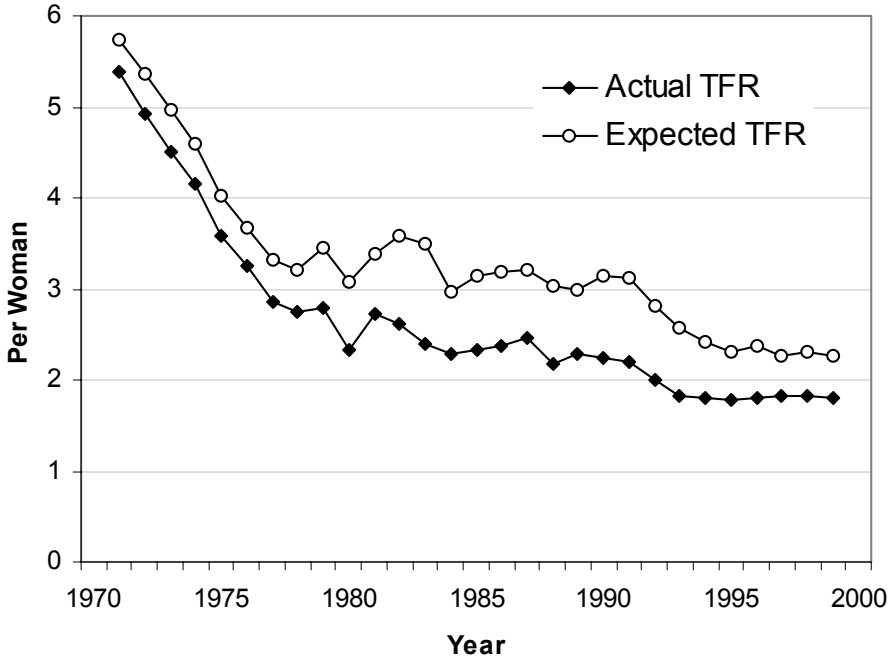
Estimates show that abortion contributed to fertility decline appreciably in China although not as importantly as in South Korea and Japan. Over 1971-1999, the total numbers of abortions in China were 256.5 millions, implying 172.0 million births averted or 21.6% reduction of the anticipated births (Table 1 and Figure 1). The effects of abortion on CBR and TFR in China are demonstrated numerically in Table 1 (column 6-9) and graphically in Figures 7 and 8. The gaps between the two curves in both the figures are intuitionally the averted fertility by induced abortion. On average, without abortion, CBR would be 3.2, 6.9 and 6.2 per 1000 points higher in 1970s, 1980s and 1990s respectively; while TFR would be 0.4, 0.8 and 0.6 births more per woman respectively.

Figure 7 Actual crude birth rate versus expected crude birth rate, China, 1971-1999



Sources: Table 1.

Figure 8 Actual total fertility rate versus expected total fertility rate, China, 1971-1999



Sources: Table 1.

Despite the less remarkable role of abortion in China's fertility transition when comparing with Japan or South Korea, it was often sensationalized out of context. The author would

argue, in terms of Japan particularly, that contraceptive policy had indirectly lead to forced abortion (as well as in some Eastern European countries); while in China forced and persuaded abortion are the result of the pressure of meeting the country's demographic goals.

Reference should be made to the differences in the development and demographic circumstances that China is situated in contrast to many developed countries during fertility transition. Population base and transitional growth in the European developed countries are much smaller than that of China, and also importantly there was historically a safety threshold—migration to overseas—through which population pressure was partly relieved. During the decades-long fertility transition in the developed countries, contraceptive knowledge and methods were leisurely developed and diffused enabling couples to exercise fertility control voluntarily and effectively according to their needs and family circumstances. China, whose population is as big as that of the entire developed world, was immediately in a disprivileged position when launching the modernization drive with the excessively high population growth resulting from the rapidly falling mortality. Social, economic and political system in China required and enabled a population planning that differed in nature from the family planning in the West.

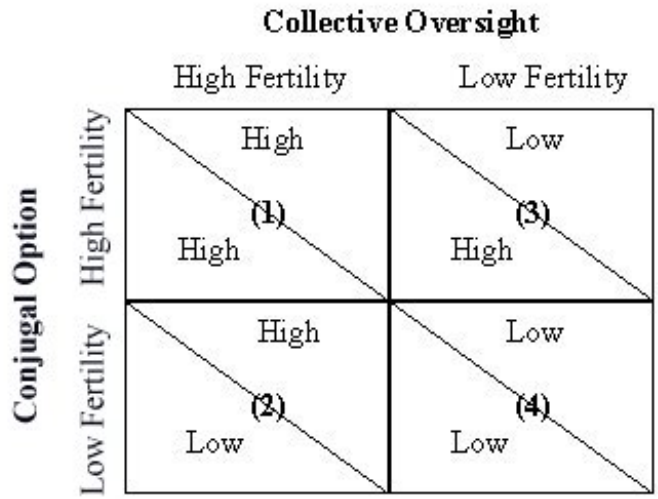
Chinese culture and values place collectiveness over individualism. When individual interests are in conflict to collective well-being, the solution is favoured for the latter. Population planning in China, as well as many other social programs, rests on the notion of advancing collective welfare rather than the narrower idea of individual or family well-being common in the developed countries. Chinese society is also organized in such a way that programs and campaigns geared towards collective well-being can be carried out rapidly and efficiently, sometimes however with heavy human cost. This has been the case over the last 2000 years in general and the past 50 years in particular. The notions of mobilization, education, persuasion and coercion should be understood in the Chinese context, and frequently Western standards do not fit.

Historically in China abortion and infanticide were fairly widely used in hard times, and this contributed to the relatively low marital fertility as compared to the West Europe. In contemporary China, abortion would also increase when couples were to limit family size in the changing socio-economic development. Substantial use of abortion in fertility transition is evident in the countries or areas of Chinese culture. However, without the stringent family

planning program in China, abortion would not increase as rapidly as it did, nor would be the fertility decline. As it is believed, direct policy intervention contributed to more than half of the millions of abortion annually.

As suggested by Tien (Figure 9), two fertility frameworks with their changing relationship characterize the fertility transitions, with potentially different implications for use of abortion. In pre-transition stage, high fertility preference is characteristic of both the collective oversight and conjugal option, subsequently contradictions are largely non-existent. Historically the developed countries had gone through the fertility transition from (1) to (2) and to (3). When couples start to shift to low fertility option while collective oversight hold high fertility ideology, conflicts result. And condemnations, attacks and persecutions in the name of religion and morality to family planning initiators and advocates ensued. Fervent confrontations finally faded away when the two fertility frameworks came to convergence.

Figure 9 Paths to controlled fertility



Source: H. Yuan Tien. 1987. Abortion in China: Incidence and Implications. Modern China 13(4): 441-468.

Unlike the West countries, the path to controlled fertility in China goes (1)-(3)-(4). Massive resistance ensued when moderately high fertility still dominates couple's preferences while unprecedentedly rapid shift to very low fertility (one-child policy) at collective level is made. A new reproductive regime is being established, involving massive applications of contraception and abortion, frequently coercive, in the name of advancing welfare for all in both short- and long-term perspective. Despite the strong criticisms from the West, this has well characterized the population policy still in much of China today.

China has often been cited extraordinary over the last two to three decades in carrying out the two most important nation-wide social programs: the family planning program and the economic reform. Socialism in the family planning program while capitalism in the economic reform are the major story in their success. Government's determination and the super-capacity of the socio-political system have been fully manifested in the two processes. At the preliminary stage of development, socialism is typically extraordinary; while high (in some instances the world's highest) abortion rates characterize virtually all the formerly and current socialist countries.

A Decomposition Analysis Using Bongaarts Model of Proximate Determinants of Fertility

Abortion is one of the four most important proximate determinants of fertility, and as described above, in some countries, it became the principal means for fertility control at times. However, researches demonstrate that, unlike our envision, even in countries with high abortion rates, abortion has an impact on fertility that is still much less great than does either contraceptive use or marriage pattern (Frejka 1983 and 1985). Only in the cases of extremely high rates of abortion—TAR of 3 or more, the fertility-inhibiting effect of abortion can rival that of contraceptive use. This only occurred in some of the second group of countries described in the last sub-section; while for the countries in the third group where abortion rates were also high by international standards and in China, where it is charged to rely on abortion to control fertility, abortion impact on fertility reduction is considerably less great than that of delayed marriage and contraceptive use, as will be shown and discussed below.

In this sub-section, Bongaarts model of proximate determinants of fertility is used to analyze the relative and absolute effects of abortion versus other components on fertility in China. According to Bongaarts and his collaborators (1978, 1982 and 1983), the proximate determinants are a range of biological and behavioral factors that directly affect fertility, the variables through which socio-economic factors must operate to influence fertility. Across the populations, four proximate determinants are primarily responsible for the levels and variations in fertility: marriage, contraception, induced abortion and postpartum infecundability. Nevertheless, other factors are not never important. For example, in China, more than 10% of the total population are migrants who largely originated from rural areas to

work in the cities, the prolonged spousal separations may reduce fecundability fairly substantially.

In Bongaarts model, the four proximate determinants shape fertility by reducing the total fecundity rate (TF). They are considered fertility inhibitors, because fertility is lower than its maximum level as a result of the inhibiting effects of delayed marriage (and marital disruption or celibacy) the use of contraception and induced abortion, and postpartum infecundability resulting from breastfeeding or abstinence. Even under natural fertility regime, these behavioral factors can reduce TF substantially to the observed fertility. The relationship of these four proximate determinants and fertility is expressed as follows:

$$TFR = C_m \times C_c \times C_a \times C_i \times TF$$

where C_m , C_c , C_a and C_i are the indices representing the four proximate determinants, respectively, i.e. the fertility-inhibiting effect of marriage, contraception, abortion and infecundability. The range in value of the indices spans from 0 to 1: 0 when a variable has a complete and perfect fertility-inhibiting effect, while 1 if such effect is totally non-existent. The lower the value of any index, the greater its fertility-reducing impact, as the index value expresses the fertility anticipated under the observed levels of the proximate determinants as a proportion of the maximum fertility when any fertility-inhibiting impact of the determinant is absent. Thus the complement of each index value indicates the proportionate reduction of fertility attributable to that proximate determinant, permitting comparison of the relative importance of the different determinants and their absolute contributions as well.

The determinants of each index are as follows (Bongaarts 1978; Frejka 1985). C_m : the two factors determining the value of the index of marriage are the average time a woman spent within marriage thus exposed to the risk of conception and the life cycle stage in which a woman lives. Marriage patterns have pronounced impact on C_m value. Early and universal marriage and low incidence of divorce and widowhood will generate C_m value of 0.7-0.8, while late and less universal marriage and high divorce rate will generate C_m value of 0.4-0.5. However, Chinese population is still characterized by universal marriage and very low divorce rate, but has a very low C_m value. For example, according to 2000 population census, C_m value in 2000 is only 0.40. Such low value is largely a result of delayed marriage.

C_c —the index of contraception—is determined by contraceptive prevalence rate and the mix of contraceptive methods which determines contraceptive effectiveness. If few practice contraception and use ineffective methods, C_c value can be over 0.9; however, extensive and widespread use of modern methods can lead to a C_c value as low as 0.2. China has the world's highest contraceptive prevalence rate, and the majority of the contraceptors use IUD and sterilization. However, contraceptive effectiveness in China is fairly low. According to a study (Wang et al. 1990) on contraceptive effectiveness using the 1988 fertility survey data, largely as a result of low effectiveness (low quality and high failure rate) of IUD and pill, the overall contraceptive effectiveness is estimated to be only 0.76. Applying the US method-specific effectiveness to the Chinese mix, the overall effectiveness would stand as high as 0.96. Despite China's low C_c value, improvement in effectiveness could still reduce the value by a great magnitude.

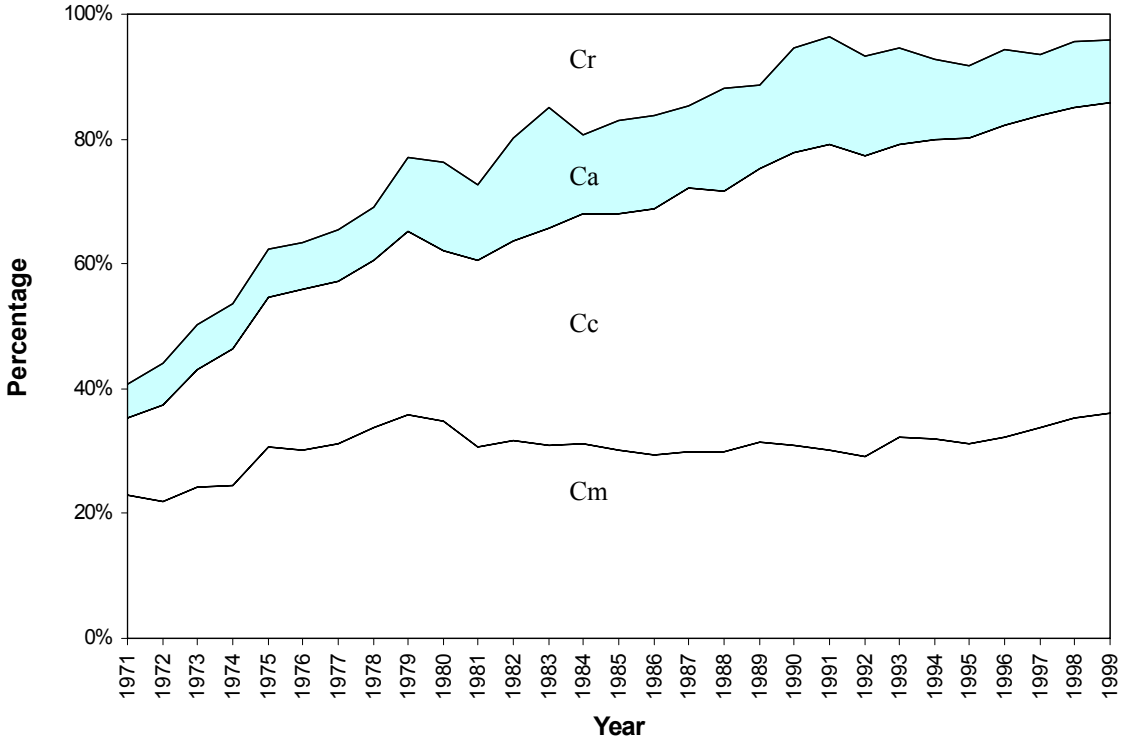
The index of abortion, C_a, is mainly determined by total abortion rate, and the functional relationship between C_a and TAR is negative. However, an induced abortion cannot avoid one live birth, because a pregnancy terminated by an abortion occupies a much shorter duration than does a full-term pregnancy in the reproductive span; but the abortion effect is strongly influenced by use of contraception following the abortion. It is estimated that 0.4-0.8 births can be averted by an induced abortion depending on the prevalence and effectiveness of contraception (Potter 1976). In China, an induced abortion is estimated to avert 0.6-0.7 births over the last two decades.

C_i, the index of postpartum infecundability, is primarily determined by the duration of breastfeeding. From traditional to modern populations, the index value ranges from 0.5-0.9. Breastfeeding in China has gone dramatic shortening over the last three decades, particularly in urban and the more developed rural areas. Thus its effect on fertility has been considerably reduced. However, due to lack of annual time-series data, C_i is not calculated directly according to the formula proposed by Bongaarts, but rather as a residual of the Bongaarts model. Hence, C_r is used to substitute C_i, capturing all other factors including postpartum infecundability.

Table 4 presents results of the Bongaarts model as applied to China. Figure 10 displays the relative importance of the proximate determinants in fertility reduction. Technical details for these calculations are presented in the Annex.

Throughout the entire period under examination, as shown in column 1-4 of Table 4 and Figure 10, marital patterns and contraceptive use are the more important fertility-modifying factors than abortion. Before 1978, the largest fertility-inhibiting factor was postpartum infecundability or the residual factors. Since China carried out the one-child policy in 1979, widespread use of contraception and delayed marriage have been exerting increasingly greater influence on fertility. In the 1970s, China's family planning policy was "later-longer-fewer", delayed marriage, which reduced fertility by 23% in 1971 to 48% in 1979, had the second largest fertility reducing impact; while abortion had the minor effect, reducing fertility by less than 20%. Less than 40% fertility-reduction came from contraceptive use, and 40-50% from the residual factors.

Figure 10 Relative contribution of the proximate determinants to fertility reduction, China, 1971-1999



Source: calculated from Table 4.

Table 4 Proximate determinants of fertility in China, 1971-1999

Year	Cm	Cc	Ca	Cr	Actual TFR	Expected TFR in the absence of			Difference between expected and actual TFR					
									Absolute			%		
	Cm	Cc	Ca	Cr	TFR	Cm	Cc	Ca	Cm	Cc	Ca	Cm	Cc	Ca
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1971	0.77	0.87	0.94	0.51	5.40	7.02	6.22	5.74	1.63	0.83	0.34	30.16	15.32	6.36
1972	0.76	0.83	0.92	0.50	4.93	6.47	5.96	5.35	1.55	1.03	0.43	31.38	20.93	8.68
1973	0.73	0.78	0.91	0.52	4.51	6.21	5.78	4.96	1.71	1.27	0.46	37.89	28.26	10.13
1974	0.71	0.74	0.90	0.52	4.16	5.87	5.65	4.60	1.72	1.49	0.44	41.39	35.89	10.65
1975	0.62	0.69	0.89	0.56	3.58	5.77	5.20	4.03	2.20	1.63	0.45	61.41	45.47	12.71
1976	0.61	0.65	0.89	0.55	3.26	5.35	4.99	3.67	2.10	1.74	0.42	64.51	53.35	12.88
1977	0.57	0.63	0.86	0.54	2.87	4.98	4.57	3.32	2.12	1.70	0.45	73.93	59.37	15.87
1978	0.54	0.61	0.86	0.57	2.75	5.09	4.48	3.21	2.34	1.73	0.46	85.27	63.00	16.63
1979	0.52	0.59	0.81	0.66	2.80	5.33	4.77	3.46	2.53	1.97	0.66	90.50	70.33	23.47
1980	0.50	0.58	0.75	0.62	2.32	4.64	4.00	3.08	2.32	1.68	0.76	100.19	72.39	32.69
1981	0.57	0.58	0.80	0.60	2.72	4.77	4.69	3.39	2.06	1.97	0.67	75.73	72.71	24.80
1982	0.55	0.55	0.73	0.69	2.62	4.75	4.74	3.58	2.13	2.12	0.96	81.30	81.08	36.56
1983	0.55	0.51	0.68	0.74	2.39	4.38	4.73	3.50	1.99	2.34	1.11	83.01	97.70	46.17
1984	0.53	0.48	0.77	0.68	2.29	4.28	4.78	2.96	1.99	2.49	0.67	86.93	108.85	29.34
1985	0.55	0.47	0.74	0.71	2.32	4.23	4.95	3.13	1.91	2.62	0.81	82.13	112.89	34.82
1986	0.56	0.46	0.74	0.73	2.36	4.23	5.13	3.18	1.86	2.77	0.81	78.83	117.10	34.40
1987	0.56	0.44	0.77	0.75	2.47	4.40	5.57	3.20	1.93	3.10	0.73	77.94	125.51	29.45
1988	0.54	0.42	0.71	0.78	2.17	4.02	5.11	3.04	1.85	2.95	0.88	85.58	135.96	40.48
1989	0.53	0.42	0.77	0.80	2.29	4.31	5.53	2.99	2.01	3.23	0.70	87.80	140.86	30.31
1990	0.54	0.39	0.71	0.90	2.24	4.19	5.82	3.15	1.95	3.57	0.90	86.85	159.27	40.27
1991	0.54	0.37	0.70	0.93	2.20	4.08	5.99	3.12	1.88	3.79	0.92	85.53	172.27	42.03
1992	0.54	0.36	0.71	0.86	2.00	3.72	5.61	2.81	1.72	3.61	0.81	86.22	180.51	40.60
1993	0.49	0.35	0.71	0.88	1.83	3.75	5.20	2.58	1.92	3.37	0.75	105.10	184.38	40.88
1994	0.49	0.34	0.75	0.85	1.81	3.69	5.31	2.42	1.88	3.50	0.61	104.13	193.17	33.49
1995	0.50	0.33	0.77	0.83	1.78	3.59	5.40	2.31	1.81	3.62	0.53	101.84	203.13	29.72
1996	0.49	0.33	0.76	0.88	1.81	3.72	5.54	2.38	1.91	3.73	0.57	105.52	206.05	31.37
1997	0.47	0.33	0.80	0.87	1.82	3.87	5.58	2.26	2.05	3.76	0.44	112.60	206.33	24.22
1998	0.45	0.33	0.79	0.91	1.82	4.00	5.53	2.31	2.18	3.71	0.49	120.00	203.73	26.66
1999	0.45	0.33	0.80	0.91	1.80	4.04	5.51	2.26	2.24	3.71	0.46	124.26	206.03	25.32

Source: Table 1 and Figure 4, and author's own calculations.

In the 1980s, the effect of delayed marriage was slightly reduced and fluctuating as a result of the enforcement of the Marriage Law in 1980 which pulled down the *de facto* legal age at marriage, the 1960s' baby boomers reaching marriageable ages and family planning policy relaxation. However, it still accounted for 44-47% fertility reduction, as compared with 23-32% reduction from induced abortion. Contraceptive use has the greatest effect, with 42-58% fertility reduction. Abortion effect and effect from the residual factors were largely similar. In the 1990s, while continued improvement in contraceptive use constituted the greatest fertility reduction, by over 60% to nearly 70%; shift to further delay in marriage reduced fertility by 50% or more. However, as abortion rate declined, its effect decreased to 20% in the late 1990s. Over the entire period, even in 1983 and 1991, the years of highest abortion number and rate, the effect of abortion was still two-thirds that of delayed marriage and contraceptive use: 30-32% reduction in fertility compared with a 45-60% reduction, respectively.

Column 6-14 of Table 4 presents absolute effect of abortion on fertility in contrast to that of other proximate determinants over the period under study. In calculating these effects, expected TFRs are computed by dividing the actual TFRs by the respective index; the difference between the expected TFRs and actual TFRs represents the absolute effect of each of the proximate determinants. While columns 8, 11 and 14 illustrate substantial absolute effect of abortion on fertility, other columns show much greater, often 3-5 times higher and recently 6-8 times higher, absolute effect from delayed marriage and contraceptive use. Without abortion, fertility would still decline fairly rapidly by international standards; however, in the absence of contraceptive use, Chinese fertility would stand very high, at pre-transitional or early transitional levels (TFR of 5 or over), throughout most of the period. If marriage patterns did not change, TFR would have been around 4-5 since the late 1970s. In the late 1990s, removal of abortion would raise TFR to slightly above the replacement level (in fact, according to highly skewed sex ratio at birth in China, replacement level fertility in China is calculated to be 2.3; thus removal of abortion would raise TFR up to the replacement level); however, in the absence of marriage postpone or contraceptive use, TFR could be doubled or tripled.

An issue of considerable interest is the role of abortion in fertility decline over the period under study. TFR in China dropped from 5.4 in 1971 to 2.8 in 1979, 2.3 in 1989 and 1.8 in 1999. How important of abortion comparing with other proximate determinants in these fertility decreases? Table 5 shows the comparative results through a decomposition analysis

of the decadal change in TFR. The decomposition formulas are developed by Casterline et al. (1984) and Singh et al. (1985).

Table 5 Decomposition of the change in TFR in China, various periods

Period	Cm	Cc	Ca	Cr	Total
		% change in TFR			
1971-79	-27.93	-28.61	-10.94	19.38	-0.48
1979-89	1.29	-31.42	-4.89	16.97	-0.18
1989-99	-15.75	-21.26	3.46	11.99	-0.22
1971-99	-33.02	-59.25	-9.96	35.60	-0.67
		Distribution of % change in TFR			
1971-79	58.07	59.48	22.74	-40.28	100.00
1979-89	-7.17	174.10	27.08	-94.02	100.00
1989-99	73.07	98.61	-16.07	-55.61	100.00
1971-99	49.56	88.92	14.94	-53.42	100.00
		Absolute change in TFR			
1971-79	-1.51	-1.54	-0.59	1.05	-2.60
1979-89	0.04	-0.88	-0.14	0.48	-0.51
1989-99	-0.36	-0.49	0.08	0.28	-0.49
1971-99	-1.78	-3.20	-0.54	1.92	-3.60

Source: author's own calculations based on the results of Table 4.

Table 5 indicates that TFR declined by 48% over 1971-79, 18% over 1979-89 and 22% over 1989-99. Over the entire period under study, TFR declined by 67%. Or in absolute terms, TFR dropped by 2.6, 0.5 and 0.5 births per woman, respectively, during 1971-79, 1979-89 and 1989-99. A total of decline of 3.6 births per woman was observed over the entire period. These proportional and absolute declines in TFR are decomposed into the various components representing the contribution from the proximate determinants. For example, the TFR decline of 48% between 1971 and 1979 is decomposed into a 28% decline due to a delay in marriage, a 29% decline due to an increase in contraceptive use, a 11% decline due to an increase of practice of induced abortion, and a 19% increase due to shortening of the duration of postpartum infecundability or some other factors. The middle panel of Table 5 are the decomposition results standardized to add to 100%, while the lower panel indicates that, for the period from 1971 to 1979, a decline of 2.6 births per woman is made up by a decline of 1.51 births per woman due to marriage postpone, a decline of 1.54 births per woman due to contraceptive improvement, a decline of 0.59 births per woman due to increased recourse to induced abortion, and an increase of 1.05 births per woman due to other factors.

The decomposition is based on a start and an end point of the periods, without taking into account the changes in the intermediate years. Nevertheless, the results reveal importantly, in a comparative manner, the role of various proximate determinants (or the various components of the family planning program in China) in Chinese fertility decline. Over the entire period, and every decade as well, fertility decline in China is achieved mainly through control over marriage and contraceptive use, or preventive methods rather than the remedial measure—abortion. Contraceptive use is the most important factor, followed by later marriage and practice of induced abortion. Other factors only work in the opposite direction. It is clear that in China, over the period 1971-1999, over 70% of the fertility decline occurred in the 1970s before the one-child policy, largely through later marriage and limiting and spacing childbearing using modern contraceptives. The coercive nature of the one-child policy including forced or persuaded abortion contributes much less importantly to the rapid fertility decline in China.

Concluding Remarks

China is one of the countries with the least restrictive abortion laws that permit abortion without restriction as to reason (Rahman et al. 1998). The changes from the total ban on induced abortion in the early 1950s to successive legalization from mid-1950s leading quickly to a completely liberalized abortion policy are associated with both the changing socio-economic circumstances and the development of the population control policy.

China's birth control campaigns were to cope with the urgency of population pressure when modernization appeared to be a distant dream. The rapidly growing population during 1950s and 1960s constituted a huge obstacle to China's social and economic development, while the pressing and ambitious goal of quadrupling GNP per capita within 20 years set by the reform and opening up policy in the late 1970s entailed slowing down of population growth as early and to the greatest extent possible. The later-longer-fewer birth control policy since the early 1970s was further contracted into the one-child policy in 1979, targeting the total population of China to be not exceeding 1.2 billion by year 2000 with zero growth rate (these demographic targets were later adjusted upward). Since the policy requirement on the number of births per couple was far below the societal preference at that time, forceful and coercive means of birth control were widely adopted in order to achieve the demographic target. Family planning operations including induced abortion were increasing sharply. Before the

start of the one-child policy in 1979, there were roughly 5 million abortions annually in China, however, the numbers suddenly climbed to nearly 10 million in 1980, and stood well over 10 million per annum throughout most of the 1980s through the mid-1990s. Since 1993 and particularly with the influence of the 1994 ICPD, China's family planning program was reformed with two transitions, that is, transition of its work philosophy and transition of the work methods. In 1995, a pilot quality of care project was carried out in East China, which was extended to 660 counties (25% of China's total counties and characterized typically by low fertility and high abortion) throughout the country by 2000. Quality of care focused on informed choice of contraceptive methods, elimination of birth quotas, reproductive health care throughout the life cycle, and prevention of order and coercion in family planning work. As a result, induced abortions in China have fallen sharply since the mid-1990s.

Proportional to its population, the number of induced abortions in China was the largest in the world, however, when translating into relative terms, China's abortion rate stood well below the world average in the late 1990s. The highest TAR, 1.68, occurred in 1983 in China, however, this figure was not only far less than the levels in Eastern European countries accommodating the abortion culture and world's highest abortion rate, but also much lower than the highest levels once reached in East Asia's other rapidly declining fertility countries. Compared with the two neighboring countries South Korea and Japan, the role of abortion in China's fertility decline is only moderate. In 1970s and 1980s when Korean fertility was dropping rapidly, abortion averted a total fertility rate of 1-1.4 births per woman. More dramatically in Japan, from 1950s to 1970s, fertility would be twice as high as its actual levels if abortions were removed. In contrast, in China even in the abortion peak periods, total fertility averted by abortion was moderately at 0.8 births per woman.

The view that China's family planning program replies heavily on induced abortion is further undermined by the illustration of the Bongaarts model of the proximate determinants. When fertility reduction was decomposed into the various contributions from the proximate determinants, both the extent to which fertility is inhibited from its biological level and the extent to which fertility is brought down from pre-transition to low level as a result of recourse of abortion is far less drastic than that from either marriage postponement or contraceptive use. The abortion role is only a third to a fourth of the importance of the other two components. In fact, research shows that only very high abortion rate, for example, the abortion rate observed in USSR, Romania and Japan in the 1950s and 1960s, can override the

fertility-reducing effects of non-marriage and contraceptive use. Unlike these high abortion countries, China throughout the fertility transition vigorously promoted and placed priority on preventive measures and made the modern contraceptive methods universally available and free of charge. Most of the Chinese fertility decline occurred in the 1970s when abortion played a minor role. However, abortion did importantly wipe off the millions of unauthorized pregnancies or pregnancies resulting from contraceptive failure in the post-one-child policy period. It is believed that a two-child policy instead of the one-child policy would well reduce the incidence of abortion while fertility could attain largely similar.

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Annex Technical Notes:

Bongaarts model of proximate determinants of fertility (Bongaarts 1978, 1982; Bongaarts and Potter 1983) is a multivariate fertility model expressed by the following equation:

$$TFR = C_m \times C_c \times C_a \times C_i \times TF \qquad (1)$$

where C_m , C_c , C_a and C_i are, respectively, the index of marriage, contraception, induced abortion and postpartum infecundability, with their value ranging from 0 to 1. The smaller the values, the larger their effects. TF is total fecundity rate, the maximum biological capacity for human childbearing, and for most populations its values fall within the range of 13-17 births per woman. In its application to China, TF value of 17 is used (Qin 1989; Gao et al. 1989; Kang and Wang 1989).

Formulas for calculating index of marriage, contraception, induced abortion and postpartum infecundability are as follows:

Index of marriage: $C_m = \dfrac{TFR}{TM} = \dfrac{\sum f(a)}{\sum [f(a)/m(a)]}$

where f(a) is age-specific fertility rate, m(a) is the proportion of currently married. If all women at reproductive ages are married, then m(a)=1, C_m=1, TFR is only influenced by C_c, C_a and C_i. In the absence of marriage, TFR is 0, C_m=0. TM is total marital fertility.

Index of contraception: $C_c = 1 - 1.08ue$

where u is the contraceptive prevalence rate and e average use-effectiveness of contraception. The figure 1.08 captures the effect of sterility. If all fecund women are contracepting with 100% effectiveness, 1.08ue=1, C_c=0, TFR=0. Otherwise, in the absence of contraception, u＝0, C_c＝1, and TFR is only influenced by C_m, C_a and C_i.

Index of induced abortion: $C_a = TFR/[TFR + 0.4(1+u) \times TAR]$

where u is the contraceptive prevalence rate, 0.4(1+u) represents number of births averted by one abortion, TAR is total abortion rate, thus $0.4(1+u)\times$TAR represents total number of births averted in a woman's lifetime by abortions. In the absence of abortion, C_a=1, TFR is only influenced by C_m, C_c and C_i. If all pregnancies are aborted, C_a=0, TFR=0.

Index of postpartum infecundability: $C_i = 20/(18.5+i)$

where 20 represents the typical average birth interval without lactation, i is the average duration of infecundability from birth to the first postpartum ovulation. i is estimated through its functional relationship with duration of breastfeeding:

$$i = 1.753\times\exp(0.1396\times B - 0.001872\times B^2)$$

Owing to its simplicity and the availability of the required data, Bongaarts model of proximate determinants of fertility has been widely used in fertility and family planning research over the last two decades, and has been shown to be robust. In this application to China, C_m, C_c and C_a are estimated directly using the above proposed formulas, but C_i is estimated as the residue of the model simply because of the lack of duration of breastfeeding data, thus is expressed as C_r. The estimated results of the indexes for China over 1971-1999 are presented in Table 4.

The major objective of the applications of the model is the estimation of the fertility-inhibiting effects of the proximate determinants. The observed fertility is the outcome of the joint impact of the proximate determinants on the TF. To assess the relative contribution of each of the proximate determinants to the generation of the observed fertility, the multiplicative model (1) can be expressed as the following additive model using logarithmic transformations:

$$\ln\left(\frac{TFR}{TF}\right) = \ln C_m + \ln C_c + \ln C_a + \ln C_i \qquad (2)$$

where ln denotes the natural logarithm transformation. The relative contribution of each of the proximate determinants to the reduction of fertility from the TF to the TFR can then be calculated as:

$$\ln C_x \Big/ \ln\left(\frac{TFR}{TF}\right) \quad \text{or} \quad \ln C_x / (\ln C_m + \ln C_c + \ln C_a + \ln C_i) \qquad (3)$$

where C_x is to be replaced, respectively, by C_m, C_c, C_a and C_i. The percentage contributions calculated from formula (3) will sum to 100%, providing a comparison of the relative magnitudes of the fertility-reducing impacts of the proximate determinants (Casterline et al. 1984). The decomposition results for China over 1971-1999 are shown in Figure 10.

However, any change in a population's level of fertility is necessarily caused by a change in one or more of the proximate determinants. Thus, an issue of great interest is to look at the contribution of the proximate determinants to the fertility change over a period under study. This is assessed with a similar approach described in equations (2) and (3). Such a decomposition analysis is conducted to reveal the quantitative contribution made by each of the proximate determinants to the decline of fertility in China over 1971-1999.

If the duration from Year 1 to Year 2 is the decomposition period, then:

$$\frac{TFR2}{TFR1} = \frac{C_m 2}{C_m 1} \times \frac{C_c 2}{C_c 1} \times \frac{C_a 2}{C_a 1} \times \frac{C_i 2}{C_i 1} \times \frac{TF2}{TF1} \qquad (4)$$

Taking natural log of the equation (4):

$$\ln\left(\frac{TFR2}{TFR1}\right) = \ln\left(\frac{C_m 2}{C_m 1}\right) + \ln\left(\frac{C_c 2}{C_c 1}\right) + \ln\left(\frac{C_a 2}{C_a 1}\right) + \ln\left(\frac{C_i 2}{C_i 1}\right) \qquad (5)$$

The proportionate contribution of each proximate determinant can be calculated as:

$$\ln\left(\frac{C_x 2}{C_x 1}\right) \Big/ \ln\left(\frac{TFR2}{TFR1}\right) \qquad (6)$$

where C_x is to be represented, respectively, by C_m, C_c, C_a and C_i. The decomposition refers to the ratio of the TFR i.e. $\frac{TFR2}{TFR1}$. The ratio is transformed to a percentage difference by subtracting 1: percentage change = $\frac{TFR2}{TFR1}$ -1, and the percentage point contribution of each of the proximate determinants is obtained as (Singh et al. 1985):

$$\ln\left(\frac{C_x 2}{C_x 1}\right)\Big/\ln\left(\frac{TFR2}{TFR1}\right)\times\left(\frac{TFR2}{TFR1}-1\right) \qquad (7)$$

The absolute effect of each component is established as:

$$\ln\left(\frac{C_x 2}{C_x 1}\right)\Big/\ln\left(\frac{TFR2}{TFR1}\right)\times\left(TFR2-TFR1\right). \qquad (8)$$

Bongaarts and Potter (1983: 107-108) developed an alternative approach to this decomposition through re-arranging equation (4) into the following:

$$\left(\frac{TFR2}{TFR1}-1\right)=\left(\frac{C_m 2}{C_m 1}-1\right)+\left(\frac{C_c 2}{C_c 1}-1\right)+\left(\frac{C_a 2}{C_a 1}-1\right)+\left(\frac{C_i 2}{C_i 1}-1\right)+I \qquad (9)$$

where I represents an interaction factor. This equation simply states that a proportional change in TFR from Year 1 to Year 2 equals the sum of the proportional changes due to the various proximate determinants plus an interaction term. Dividing each item at the right-hand side of the equation by the proportional change in TFR (left-hand side of the equation) yields the distribution of percentage of change in TFR. When this percentage distribution is multiplied by the absolute fertility decline (TFR2-TFR1), absolute change in TFR resulting from change in each of the proximate determinants is established. The two decomposition methods produce slightly different results.