CHANGING PATTERNS IN DETERMINANTS OF FERTILITY DECLINE IN CHINA IN THE 1980'S

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1. INTRODUCTION

To study the mechanism of China's fertility decline has drawn much and increasingly attention by demographers in recent years because of the fact that fertility decreased substantially in a short period of time. Some have asserted that China's fertility decline was largely due to the intensive family planning program, whereas socio-economic development only played a minor role in this process which thus has been viewed as an "induced fertility transition" (Bongaarts and Greenhalgh 1985; Mauldin 1982). Some cross-sectional studies on the relationship between fertility and socio-economic development and family planning factors, however, have shown that socio-economic development also played an important role in the decline, apart from the role of family planning (Peng, 1992; Poston and Gu, 1987; Tien, 1984). The mechanism of fertility decline in China hence remains unclear and need further studies.

The total fertility rate in China as a whole shows less variation in the 1980s than in the previous decade. However, substantial spatial difference in fertility remained in all years in the 1980s. More importantly, unlike the years before 1980, with the implementation of the policy of "reform and opening to the outside world" at the beginning of the 1980s, socio-economic and institutional settings in China as a whole have changed and improved greatly, while their regional diversity may even have widened, which inevitably affect the family planning efforts and other factors such as cultural and therefore the patterns of fertility. This provides a more reasonable base on which we can examine the extent to which the variations in socio-economic development, women's status and family planning efforts are related to the variations in fertility, and most importantly, its changes over time. Therefore, in this research, I propose to construct a causal model and use path analysis as the analytical tool to study provincial level fertility variations in 1981 and 1990 in order to unravel the causal effect of fertility change.

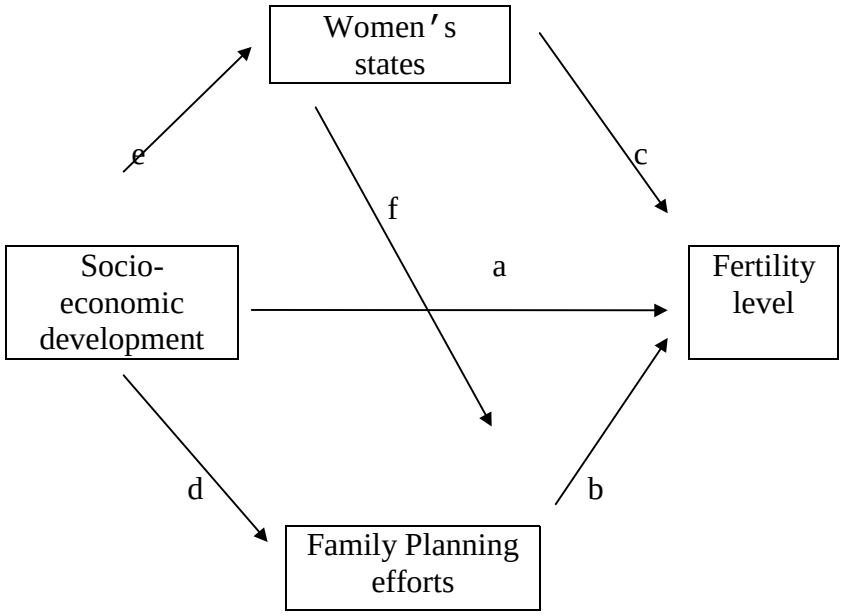
After examining the contributions of socio-economic development, women's status and family planning efforts effect on fertility, a new concept patterns of determinants of fertility decline will be introduced in this research. Two patterns "fertility control" and "fertility influence" can be distinguished. The former is defined as a state in which the fertility decline or variation is largely due to some fertility control factors such as family planning efforts. Fertility influence is another pattern in which the fertility decline is largely due to the factors such as socio-economic development, whereas control factors only play a minor role. Of course, a mixed pattern, rather than pure fer-

tility control or pure fertility influence is possible. The reason for this is, I believe, that each pattern reflects the different mechanism or structure of fertility decline and, therefore, has significant different policy implications, at least in the case of China.

Theoretical Framework and Methodology

The analytic question motivating this research concerns the extent to which socio-economic development, family planning efforts and women's status factors explain fertility difference among the provinces in China. The theoretical framework addressed these questions schematically represented in Figure 1

Figure 1 - The Theoretical Framework on the Relationship Between Socio-economic Development, Women's Status and Family Planning Efforts and Fertility Level.



While controversy still remains on the issue of relative importance of socio-economic development and family planning program in fertility behaviour in developing countries, the consigns has been reached among demographers in recent years that both two factors play an important role in fertility decline. Socio-economic development is viewed as influencing aggregate fertility directly by generating the demand for and use of non-program means of limiting births (Black 1965). Hence, spatial (cross-sectional) variation in socio-economic development can influence spatial variation in fertility. This direct socio-economic development effect on fertility variation is represented by path "a" in Figure 1.Socioeconomic development also can influence aggre-

gate fertility indirectly by generating the demand for and use of family planning program, supplying means of limiting births, but also because it represents the infrastructure and the socio-political context that influence the extent to which family planning program can and will be implemented by government and community (Hernandez 1984: 101-102). The indirect effects of socio-economic development on fertility through family planning efforts are represented by the conjunction of paths "d" and "b" in Figure 1. Socio-economic development also can influence aggregate fertility indirectly by broadening women's role options and therefore improving women's status. These indirect effects of socio-economic development on fertility are represented by the conjunction of paths "e" and "c" in the Figure.

On the relationship of women's status and fertility behaviour, a principal focus has been on the relationship between women's labor force participation, education level and life expectancy at birth and fertility. Many studies on the issues appear to suggest that other things being equal, increases in such macro-level phenomena as urbanization, and industrial growth and development will tend to lead to a more equitable access to socio-economic and other valued resources for women than had been the case previously. The widening of women's options should be conducive to desires for family size reductions, therefore increasing the use of family planning, and hence decreasing fertility (for more detail discussion see Poston, 1992, and Simmons, 1988: 179-190). Therefore, we assume that women's status can directly influence fertility and indirectly influence fertility through family planning efforts. Women's status direct effect on fertility is represented by path "c", its indirect effects on fertility through family planning efforts by the conjunction of paths "f" and "b" in Figure 1.

Effect of family planning efforts on fertility is clear, either through technology and information services or through government's bureaucratic apparatus. Hence, cross-sectional variation in family planning efforts can influence cross-sectional variation in fertility. This effect is represented by path "b" in Figure 1.

The research hypotheses thus are summarized as follows: (a), The spatial (cross-sectional) variation in fertility should be explained by the variation in socio-economic development, women's status and family planning efforts.(b), Socio-economic development, women's status and family planning efforts all have a direct negative effect on fertility. (c), Socio-economic development also has indirect negative effects on fertility through women's status and family planning efforts, so does women's status through family planning efforts. (d), Regarding the indirect effects, the

effects of socio-economic development per se on family planning efforts and women's status, and the effects of women's status per se on family planning efforts should be positive.

The empirical research of the causal model described above will use path analysis as analytical tool to study provincial level fertility variation in 1981 and in 1990. The socio-economic development, family planning and women's status variables are the measured variables in this model. Path coefficients are the standardised partial regression coefficients (beta) from multiple regression equations. Each path coefficients represents the amount of standard deviation change in the dependent variable of a change of one standard deviation in the independent variable (holding constant the other independent variable).

By using this method, we can obtain the total direct and indirect effects of these independent variables on the fertility rate. The total effect of a variable on fertility is the zero-order correlation coefficient between the variable and the total fertility rate. The direct effect is the path coefficient between the independent variable and the fertility. The total indirect effect is the difference between the total effect and the direct effect. We can also decompose the total indirect effect on fertility into the several components. For example, the total indirect effect of socio-economic development on fertility can be decomposed into the three components: the indirect effect on fertility via women' status, the indirect effect on fertility via family planning, and the indirect effect on fertility through all other independent variables in the model, we refer to this last effect as the spurious component of the total indirect effect, or the joint effect.

Unit of analysis in the research refers to 28 provinces (include municipality and autonomous region) in Mainland China. The provinces of Hainan and the autonomous region of Tibet are excluded from the research because of data unavailable for the sub-regions. Thus, the universe of analysis, i.e. the number of observation, is 28. The data for this cross-sectional study pertain two years 1981 and 1990 (some variables refer to 1982 and 1989, due to lack of data for the years of 1981 and 1990).It should be noticed that a limitation of the study is that, because of lack of data, the study does not include the data for prior time periods, say 1970s. It is in this period that China experienced the most rapid decline of fertility. Also, data for the 1980s are still of varying quality due to imperfect statistical data collection system. The reader should keep in mind these problems when I discuss the results and policy implications of the study.

Variable Identification

In order to assess the extent to which socio-economic development, family planning efforts and women's status affect fertility level in the analytic model, one of the key points may be the appropriate selection of the three categories of variables and their measurement. Table 1 shows the means and standard deviations for the dependent variable and independent variables for 28 provinces of China in 1981 and 1990. The values for each selected and some suggested variables are shown in Appendix 1, 2 and 3. Here, there is a need to describe each of these variables in slightly more detail before applying them to the analytical model. The dependent variable pertains to the total fertility rate of the 28 provinces in the years of 1981 and 1990. TFR variables have mean values of 2.7 in 1981 and of 2.3 in 1990, with standard deviations of 0.84 and 0.47, respectively.

2. SOCIO-ECONOMIC DEVELOPMENT VARIABLES

It has been suggested that socio-economic development include at least four of the conceptually distinct dimensions of modernization: structural development, female status, quality of life and rural quality of life (Poston and Gu, 1987). Cutright and Kelly (1980) also have pointed out that the main indicators of modernization relevant to fertility were urbanization, education, and living standards. Following them, and taking into account the particular purpose of the research[1] and the specific characteristics in China, we suggest eight variables to construct the socio-economic development index.

PINCOM: per capita income (measured in Yuan), which represent per capita net material product and is calculated at current prices. **URBAN**: urbanization level, which is defined as the percentage of population living in cities and towns (city is a place over 10 000 in size; town is a place under 10 000 and larger than 3000 in size). **DENSITY**: the number of persons per square kilometre. **HANPOP**: percentage of Han Chinese. China includes 56 nationalities among which Han-nationality accounts for about 90% of total population and the others take only about 10%. It is not just a demography phenomenon, perhaps more importantly, reflects the differences of social,

[1] We want to examine the relative effects of socio-economic development and women's status on fertility, hence, the female status dimension should be excluded from socio-economic development index, otherwise there must be a very high correlation between them, which may results in bias in regression analysis. However, when discussing the relative effects of socio-economic development and family planning efforts on fertility, it is reasonable and necessary to take into account socio-economic development and women's status together in order to compare the effects of family planning efforts.

economic, cultural, and political contexts. In generally, the minorities people agglomerate in remote regions where socio-economic development is much less than that of other regions. **RCONS**: annual per capita consumption for rural household. It is calculated at constant price in 1952. **DOCTOR**: doctors per 100 000 population. **TLIT**: literacy rate of all persons aged 15 and over[2]. A literate person is one who knows at least 1500 Chinese characters, is able to read simple books and newspapers, and write simple messages. **TLIFE**: life expectancy at birth of total population.

Following Cutright (1980) and Poston (1987), we have constructed a socio-economic development scale by standardizing each variable to a mean of zero and variance of one, summing the standard items and dividing by the sum of their standard deviations, i.e. the number of variable. The higher the score, the higher the socio-economic development levels. We then have two indices which are labelled socio-economic development 1981 and socio-economic development 1990. These scales are internally consistent: Cronbach's alpha[3] is 0.90 for the 1981 index and 0.91 for the 1990 index.

[2] According to 1982 Population Census, data for this variable in 1981 is available for the persons aged 12 and over. For the comparison, we have transformed them in terms of persons aged 15 and over which is the register criteria in 1990 Population Census

[3] Cronabach's alpha-coefficient is used to assess the "reliability" or internal consistency of a composite index. It concerns how stable and replicable a composite index is at measurement under different circumstances, for example, when administered by different interviewers. Reliability here is opposed to validity which concerns how well the index represents the concept being measured (see STATA Reference Manual Vol.2 [5s] for more detail).

Table 1--Means and Standard Deviations for Total Fertility Rate, Socio-economic Development Variables, Women's Status Variables, and Family Planning Variables: 28 Provinces of China, 1981 & 1990

Variable Description	1981 Mean	1981 S.D	1990 Mean	1990 S.D
Total fertility rate(TFR)	2.71	0.84	2.30	0.47
Socio-economic development variables				
Per capita income(PINCOME)	512.68	469.19	1476.32	918.48
Urbanization level(URBAN)	25.77	15.83	31.11	16.62
Density per square kilo-meter(DENSITY)	298.68	365.00	336.54	404.96
Percentage of Han-Chinese(HANPOP)	89.39	15.70	87.94	15.70
Per peasant annual consumption(RCONS)	165.39	69.63	287.46	171.22
Doctorsper100.000population(DOCTOR)	158.82	83.83	189.21	95.00
Total life expectancy at birth(TLIFE)	67.56	3.21	69.06	3.12
Percentage population literate(TLIT)	65.97	10.80	77.41	8.70
Women's status variables				
Sex difference in life expectancy at birth(DLIFE)	2.57	1.15	2.95	1.03
Sex difference in literacy(DLIT)	-26.35	7.60	-19.06	6.38
Sex difference in non-agricultural employment(DNOAGR)	-7.59	6.83	-6.18	3.81
Family planning efforts variables				
Contraceptive prevalence/ effectiveness rate(CPE)	0.75	0.08	0.83	0.06
Birth planning rate(BPRATE)	70.00	11.51	84.69	8.95
Percentage of one-child certificate holders(ONECERT)	33.29	22.93	46.31	18.18

Data Source:
1990: TFR, PINCOME, URBAN, HANPOP, TLIT: Basic Data of China's Population, China population Information and Research Centre(CPIRC)/UNFPA (1994); DENSITY, DOCTOR, BPRATE, CPE: China Population Information Handbook(1990), CPIRC, 1991; ONECERT: CPIRC (1991) and China Population Statistics Yearbook (1993), State Statistical Bureau (SSB); TLIFE, DLIFE: Population Research(1994,3), Institute of Population Studies, People's University of China; DNOAGR: the data on 1990 population census of China, SSB, 1992; RCONS: Xu Li, research paper (1993), ISS.
1981: TFR, PINCOME, URBAN, HANPOP, TLIT, DENSITY, RCONS, DLIT: the same as in 1990; DOCTOR, CPE, BPRATE: Poston & Gu, 1987; ONECERT: Arnold & Liu, 1986; TLIFE, DLIFE: CPIRC/UNFPA (1994); DNOAGR: 10 percent sampling tabulation on the 1982 Population Census of China, SSB, 1983.

3. WOMEN'S STATUS VARIABLES

As mentioned earlier, on the relationship between women's status and fertility behaviour, a principal focus has been on the relationship between women's labor force participation, education level and life expectancy at birth and fertility (for example, Lee, 1986; Leecere, 1990; Poston, 1992; Poston and Gu, 1987). However, these three variables may also reflect dimensions of overall socio-economic development. Graphs between socio-economic development index described above and both male and female

life expectancy at birth, literacy rate and non-agricultural employment rate show there existed strong positive relationship. High correlation between socio-economic development index and each of these three variables also support our argument (see Table 2). Therefore, in this particular study on fertility variation, the female specific rate and proportion are not appropriate variables of women's status.

It is believed that the relative status of women compared to men may be a better indicator in terms of decision making at the family level relevant to reproductive behaviour and fertility. Therefore, instead of focusing on women specific rate and proportion, we turn to focus on difference in life expectancy at birth, literacy rate and non-agricultural employment rate between men and women so as to measure women's status in each of 28 provinces. The new variables in terms of this definition are described follow:

Table 2 - Correlation Coefficients between Socio-economic Development Index and Male and Female Life Expectancy at Birth, Literacy Rate and Non-agricultural Employment Rate: 28 Provinces, 1981 & 1990

	Life expectancy at birth		Literacy rate		Non-agricultural employment rate	
	Male	Female	Male	Female	Male	Female
Socio-economic (1981)	.765	.743	.773	.758	.885	.842
--development (1990)	.833	.793	.710	.683	.913	.908

DLIFE: difference in life expectancy at birth between women and men, which is calculated by subtracting male life expectancy at birth (**MLIFE**) from female one (**FLIFE**). **DLIT**: difference in literacy rate between women and men, obtained by subtracting male literacy rate (**MLIT**) from female literacy rate (**FLIT**). **DNOAGR**: difference in non-agricultural employment rate between women and men, which is calculated by subtracting male non-agricultural employment rate (**MNOAGR**) from female one (**FNOAGR**).

Again, the three variables are combined into a single index in order to measure relative position of women's status in each of 28 provinces. The computed Cronbach's alphas which are 0.48 for the 1981 index and 0.62 for the 1990 index, imply a low degree of internal consistency of the two indices. A further investigation of the three variables suggests that the positive value of DLIFE and the negative value of DLIT and DNOAGR may result in a cancelled effect of women's status if they are combined into

a single index. There are also low correlation between DLIFE and TFR (-0.28 for 1981 and -0.29 for 1990). The DLIFE variable is thus excluded from our women's status indices. The final indices indicating relative position of women's status consist of two variables --DLIT and DNOAGR, with a high degree of reliability (Cronbach's alpha is 0.77 for the 1981 index and 0.81 for the 1990 index).

4. FAMILY PLANNING EFFORTS VARIABLES

In those countries where family planning programs are more voluntarily carried out by government or communities or both, there is little question that contraceptive prevalence should be a good variable reflecting the family planning programs or efforts. It is however not the case of China. Because of the powerful bureaucratic efforts in the implementation of family planning, the term "efforts" used here includes the influence of some program factors and non-program factors. Thus, some other variables must be used in order to properly measure the efforts of family planning. We suggest three indicators described as follow:

BPRATE: birth planning rate, which is defined as the percentage of "legitimate" births according to Chinese family planning policy. Its numerator includes almost all first-order births, plus those second-order births and higher which are also permitted from the policy; the denominator is all births in given year. The justification for these variable lies in the fact that it is a main indicator to reflect the "family planning work" which is emphasized by governments at all levels. **ONECERT**: percentage of couples who hold one-child certificates. Certificates holders are those parents with one child who have pledged to have no more children. This variable may reflect, at some extent, the reproductive desire of couples. **CPE**: contraceptive prevalence/ effectiveness, which reflects the degree to which married fecund women are using effective contraception. The CPE measure equals 1.0 if all fecund married women are using 100% effective contraception, and 0 in the absence of contraception[4](see Appendix 4 for calculation).

The three variables described above are combined into a single index reflecting the level of family planning efforts with a high degree of internal consistency (Cronbach's alpha is 0.83 for the 1981 index and 0.74 for the 1990 index). It is clear that the

[4] The CPE measure was adapted from the Cc (index of contraception) developed by Bongaarts and Potter (1983) and is based on data on contraception prevalence and use effectiveness. Unlike Cc index, CPE is used to measure contraceptive effectiveness rather than ineffectiveness (Poston and Gu, 1987)

variables described above have been overreported in China, however, taking into account the influence of bureaucratic apparatus which is difficult to be measured, these variables may better reflect the family planning efforts.

Results and Discussion

It has been hypothesized in the theoretical framework that among the Chinese provinces in this period, all the socio-economic development variables, women's status variables and family planning variables should be negatively related with fertility. Table 3 presents zero-order correlation coefficients indicating the relationship between the total fertility rate and each variable for the 28 provinces. All variables show the expected negative relationship with fertility.

Table 3 - Zero-Order Correlation Coefficients Between Total Fertility Rate and Socio-economic Development, Women's Status and Family Planning Variables, 1981 & 1990

variables	correlation coefficients	
	1981	**1990**
Socio-economic Development		
PINCOME	-.576	-.731
URBAN	-.582	-.758
DENSITY	-.550	-.533
HANPOP	-.780	-.499
RCONS	-.457	-.602
DOCTOR	-.480	-.618
TLIFE	-.647	-.613
TLIT	-.634	-.533
Women's Status		
DLIFE	-.281	-.291
DLIT	-.476	-.447
DNOAGR	-.373	-.526
Family Planning Efforts		
CPE	-.695	-.367
BPRATE	-.839	-.758
ONECERT	-.768	-.822

Note: for variable description see page 6, Table 1

However, the relative effects of the variables on fertility vary considerably. In 1981, three of family planning efforts variables and one of the socio-economic development variables have the highest correlation: the birth planning rate (-0.84), the one-child certificate holder rate (-0.77), the contraceptive prevalence/ effectiveness rate (-0.70) and the percentage of Han-Chinese population (-0.78). The other seven socio-economic development variables have a modest correlation with fertility, and women's

status variables have the lowest correlation with fertility. In 1990, two of the family planning efforts variables and two of the socio-economic development variables have the highest correlation: the birth planning rate (-0.76), the one-child certificate holder rate (-0.82), the per capita income (-0.73) and urbanization level (-0.76). Generally, socio-economic development and women's status variables show somewhat higher correlation with fertility in 1990 than in 1981, whereas family planning efforts variables show a lower correlation with fertility in 1990 than in 1981.

The changes in correlation in some variables during this period may be more important. The largely reduced correlation of contraceptive prevalence/effectiveness with fertility from -0.70 to -0.37 in this period may imply that the effects of family planning program providing contraception and forcing people use contraception have largely weakened. The effects of the percentage of Han-Chinese population variable on fertility have been also substantially decreased from -0.78 in 1981 to -0.50 in 1990. This reflects the fact that there was no effective family planning program before the mid-1980s in minority populations. Some variables, such as per capita income, per capita consumption in rural household, doctors per 100.000 population and sex difference of non-agricultural employment rate etc., have the expected increased correlation with fertility, which shows the increasingly important effects of socio-economic development on fertility behaviour.

Three single indexes constructed in the last section to indicate the relative position of socio-economic development, women's status and family planning efforts among 28 provinces both in 1981 and in 1990 also have an expected negative relationship with fertility and a positive relationship among themselves, as shown in Table 4.

Table 4 - Correlation Coefficients Between Socio-economic Development Index, Women's Status Index and Family Planning Efforts Index and Total Fertility Rate, 1981 & 1990

	TFR		Development		Women's status		Family Planning	
	1981	1990	1981	1990	1981	1990	1981	1990
TFR	1.000	1.000	-.77	-.78	-.52	-.57	-.89	-.86
Development			1.000	1.000	.49	.50	.77	.70
Women's status					1.000	1.000	.50	.49
Family planning							1.000	1.000

By applying these indices to the path analytical model proposed in theoretical

framework, we have obtained the total, direct and indirect effects of socio-economic development, women's status and family planning efforts on fertility. Table 5 shows the results of two models which refer to the case of 1981 and 1990. The total effect of an index on fertility (column 1) is the zero-order correlation coefficient. The direct effect (column 2) is the path coefficient between the independent variable and the TFR. The total indirect effect (column 3) is the difference between the total effect and the direct effect. The total indirect effect has been decomposed into the following components: the indirect effect on fertility via family planning efforts (column 4), the indirect effect on fertility via women's status (column 5), and the indirect effect on fertility through all other independent variables in the model, that is spurious or joint effect (column 6). Figure 2, 3 and Appendix 5 present the path coefficients (included residual paths) and their t-tests values of two models.

Table 5 - Total, Direct and Indirect Effects of Socio-economic Development, Women's Status and Family Planning Efforts on Fertility: 28 Provinces of China, 1981 & 1990

Measures	Total effect (1)	Direct effect (2)	Total indirect effect (1)-(2) (3)	Effect via family planning (4)	Effect via women's status (5)	Joint effect (6)
MODEL 1 (1981)						
Development	-.77	-.18	-.59	-.50	-.03	-.06
Women's status	-.52	-.07	-.45	-.12	n.a.	-.33
Family planning	-.89	-.73	-.16	n.a.	n.a.	n.a.
MODEL 2(1990)						
Development	-.78	-.31	-.47	-.35	-.07	-.05
Women's status	-.57	-.14	-.43	-.10	n.a.	-.33
Family planning	-.87	-.57	-.30	n.a.	n.a.	n.a

Note: n.a. = not available.

In model 1 (see Figure 2), which refers to the case of 1981, the family planning efforts index has a strong direct negative effect on fertility ($\beta\beta$=-0.73). Socio-economic development index only has a trivial (and not statistically significant) negative direct effect on fertility, but a sizeable negative indirect effect through family planning index. Women's status index has a negligible (and also not statistically significant) negative effect on fertility both in directly and in indirectly.

Model 2 (Figure 3) reflects the case of 1990. Still, family planning efforts show

a sizeable negative direct effect on fertility (β=-0.57), and the direct and indirect negative effects of women's status on fertility remain very trivial and not statistically significant (β=-0.14 and -0.10). Socio-economic development now has a significant negative direct effect on fertility (β=-0.31) and indirect negative effect on fertility (β=-0.35) through family planning efforts.

Figure 2 - Path Model 1 of the Effects of Socio-economic Development, Women's status, and Family Planning Efforts on Fertility, 1981

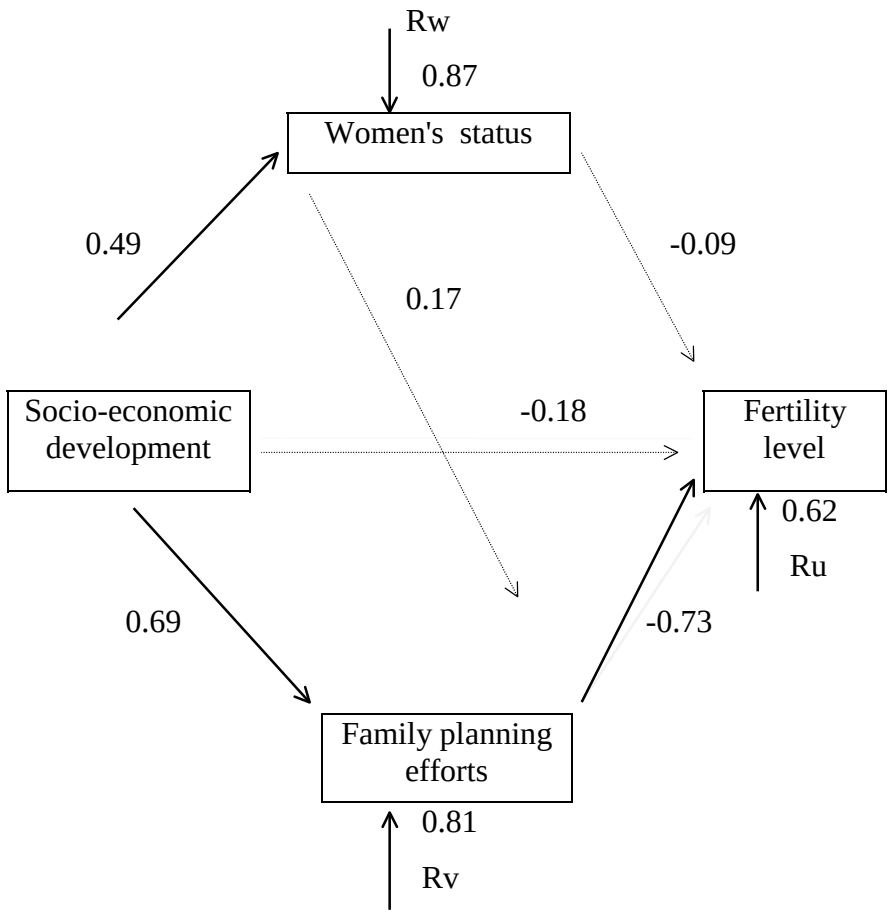
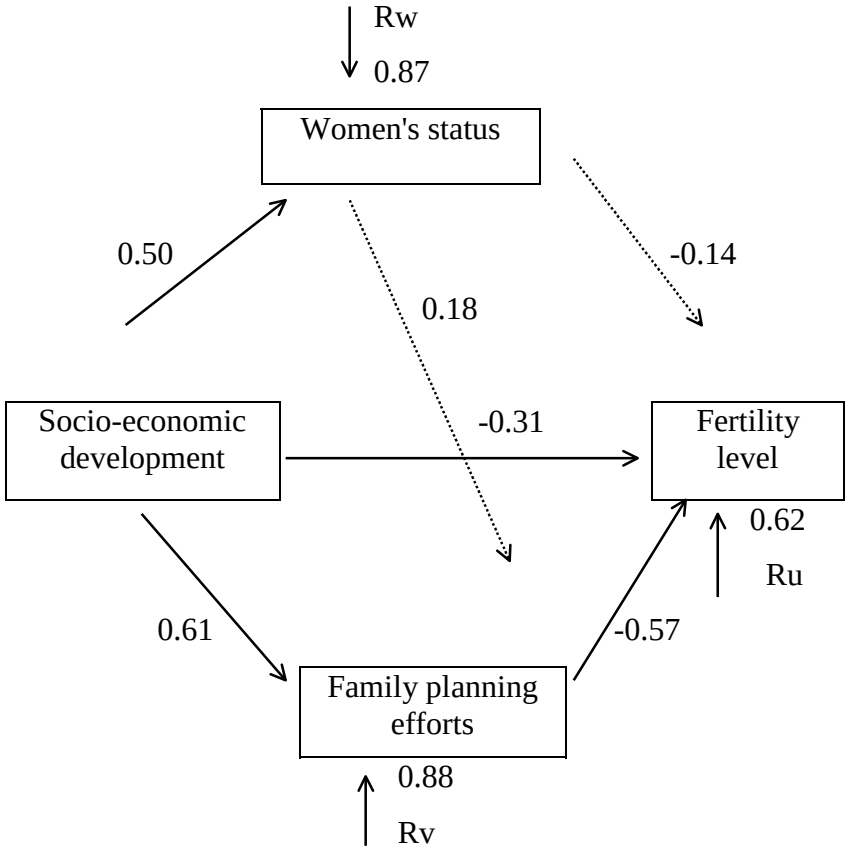


Figure 3 - Path Model 2 of the Effects of Socio-economic Development,

Women's status, and Family Planning Efforts on Fertility, 1990



Note: ------: not statistically significant;
____: significant at 0.05 level or better.

Some results appear to be consistent for the two theoretical models. In all models, the family planning efforts shows strong direct negative effects on fertility and socio-economic development shows much weaker direct negative effects on fertility than that of family planning, whereas women's status only shows trivial direct and indirect negative effects on fertility. Socio-economic development also has moderate indirect negative effects on fertility through family planning. All indirect effects on fertility via women's status are negligible, although they are all negative.

The findings that there were no statistical significant effects of women's status on fertility variation seems to be consistent with the findings elsewhere (Lee 1986, Leclere 1990) and need further discussion. Given the fact that the fertility level were already very low both in 1981 and in 1990, it is not surprised that the further improvement of women's status are not necessary to influence fertility level. It is also possible that the further improvement of women's status may even have a positive effects on fertility in some population where fertility is already very low. One may agree that the

relationship between women's status and fertility level should consider the particular stage of fertility transition. The role of women's status may be more important at the transition from high fertility to low fertility or replacement level than at the transition from already low fertility level to further lower fertility. In the latter stage, the women with relative high status may be more interesting in giving heather births than giving less births. Other explanations are also possible. We did not account for the simultaneous determination and reverse causality of women's status and fertility in models, which may underestimate, as Balk (1994) pointed out, the effects of women's status on fertility. In addition, women's status is still narrowly defined in the research, for example, such dimensions as autonomy and authority within family and political participation etc. were not taken into account. Nevertheless, the results of the research seems to support the suggestion that the theory concerning the relationship between women's status and fertility behaviour must be re-examined (Leclere, 1990).

The empirical tests of the model also show some important changes took place during this period:

(a), The direct negative effect of socio-economic development on fertility has been substantially increased from -0.18 in 1981 to -0.31 in 1990 (and from not statistically significant to statistically significant), with a 70% increase. Its indirect negative effect on fertility through family planning has been decreased by 30%, but remains moderate (β=-0.35). More importantly, the direct effect was only one third of the indirect effect in 1981, whereas in 1990, they have almost the same weight in the role of fertility variation (see Table 6). It means that the structure or mechanism that socio-economic development affect reproductive behaviour and fertility has been changed substantially. In 1981, socio-economic development influences fertility variations among 28 provinces mainly through family planning program. The situation has been changed in 1990. Socio-economic development also can substantially influence the fertility directly by generating the demand for and use of non-program means of limiting births.

(b), Most importantly, the structure that socio-economic development, women's status and family planning efforts affect fertility rate has being changed. Of all the direct negative effects in 1981, socio-economic development and women's status together accounted for about 25% weight in contrast to 75% weight of family planning. Up to 1990, however, the two factors share nearly the same weight with 45% of the former

and 55% of the latter. The family planning seems to be no longer a single predominant factor affecting fertility.(see Table 7).

Table 6 - The Relative Effects of Socio-economic Development on Fertility, 1981 & 1990

	Total effect (1)	Direct effect (2)	Indirect effects via family planning (3)	(2)/(3)
1981	-.77	-.18	-.50	0.36/1
1990	-.78	-.31	-.35	0.89/1

Table 7 - The Relative Direct Effects of Socio-economic Development, Women's Status and Family Planning Efforts, on Fertility, 1981 & 1990

	Socio-economic development and women's status effect (1)	Family planning efforts effects (2)	(1)/(2)
1981	-.25	-.73	0.34/1
1990	-.45	-.57	0.79/1

The question proposed in the introduction that which pattern of determinants of fertility decline--fertility control or fertility influence--should be attributed to China's fertility can be answered now. It is clear that fertility control should be attribute to the pattern of determinants of fertility decline in China in 1981, because the fertility variations among 28 provinces were largely determined by family planning efforts, while there were no statistically significant effects of socio-economic development and women's status on fertility variations. Even though socio-economic development shows a strong indirect effects on fertility, they were through family planning program. In 1990, although family planning efforts remain more important factor in fertility variation, the socio-economic development also show a substantial direct and indirect effects on the variation in fertility. In a strict sense, therefore, the pattern of determinants of fertility in China, at least in the end of 1980s, should no longer be viewed as "fertility control". Instead, it appears more reasonable to say that it is a mixed pattern of "fertility control" and "fertility influence", or it is in a period of transition from the former to the latter.

5. CONCLUSIONS

The research was concerned with assessing the degree to which socio-economic development, women's status and family planning variables are related to the fertility rate among 28 provinces, municipalities and autonomous regions of China in 1981 and 1990, and most importantly, their changes during this period. For each of the 28 provinces of China, we obtained data on 8 socio-economic development variables, 3 family planning efforts variables and 3 women's status variables in 1981 and 1990. Women's status was measured in terms of difference in education and non-agricultural employment rate between women and men. The dependent variable was the total fertility rate. We also constructed three single indexes to measure the three sets of variables: socio-economic development, women's status and family planning efforts. We then applied them to path analysis to test proposed theoretical model of fertility patterns. This model postulated direct negative effects of socio-economic development, women's status and family planning efforts on fertility, and indirect negative effects of socio-economic development on fertility through family planning and through women's status which also has indirect negative effect on fertility via family planning efforts.

Two empirical tests of the theoretical model indicated consistently strong negative direct effects of family planning efforts on fertility, weaker direct negative effects of socio-economic development on fertility, and trivial direct negative effects of women's status on fertility. It is also found that there existed strong or moderate indirect negative effects of socio-economic development on fertility through family planning efforts, and a negligible indirect negative effects via women's status which also had a trivial indirect negative effects on fertility through family planning efforts.

Regarding the changes in the role of the three factors from 1981 to 1990, it has been found that the direct negative effects of family planning efforts on fertility decreased by 20%, whereas the direct negative effect of socio-economic development on fertility increased by 70%. The indirect negative effects of socio-economic development on fertility via family planning efforts decreased by 30%, but still remain moderate. Although women's status showed more or less increased effects on fertility, its lack of statistical significance in all models make us avoid the risk of overestimating its role in fertility decline.

The findings of the test suggested that the pattern of determinants of fertility decline in China in 1981 should be viewed as "fertility control", because the variations in

fertility among China's provinces were principally attributed to the family planning efforts which has been viewed as "control" factor in my research, whereas socio-economic development and women's status which have been viewed as "influence" factors only played a minor role in fertility variations. However, such "influence" factors played a increasingly important role in fertility variation, and even shared a same weights with "control" factor up to 1990. Certainly, their effects can not be ignored. In a strict sense, therefore, the pattern of determinants of fertility in China, at least in the end of 1980s, should be viewed as mixed one of "fertility control" and "fertility influence" instead of solely the former or the latter, or as in a period of transition from the former to the latter.

This imply that no longer a single factor plays a predominant role in fertility decline. It is believed that the nature or mechanism of the effects of socio-economic development and the effects of family planning efforts are different, with the former more sustained to fertility decline and the latter more fluctuated due to its more or less coerciveness in China. The research findings therefore appear to suggest that, because of socio-economic development's significant and increasingly important effect on reproductive behaviour, the current low fertility level in China is, to a large extent, sustained. That is, the fertility rate would not rebound substantially provided that the intensive family planning efforts be weakened. This provide the possibilities to adjust the current family planning policy especially the administrative regulations in the coming years.

Although the research did not find the significant effects of women's status on fertility variations in 1980s, a higher priority still should be given to improving women's status, including their education, employment opportunities and etc.. Such activities must be viewed not only as a means of furthering fertility reduction, but also, perhaps more importantly, as a way of attaining other social and economic objectives, and as a desirable goal in itself. A comprehensive sustainable development policy must include the efforts to accomplish the overall improvement of women's status in terms of gender quality.

However, our endeavour is still limited. Except for the limitation that we did not take into account the data in 1970s in which China experienced the most rapid decline of fertility, there are also some deficiencies in definition and measurement of independent variables. Moreover, the theories on the relationship between socio-economic development and family planning program and fertility, especially between women's status and fertility should be rethought. Further studies on the issues are necessary,

which is important not only to China, but also, I believe, to other developing countries.

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TABLES

Appendix 1 Values for the Total Fertility Rate, 8 Socio-economic Development Variables and 3 Family Planning Variables for 28 Provinces of China, 1981

PROVINCE	PINCOME	URBAN	DENSITY	HANPOP	RCONS	DOCTOR	TLIFE	TLIT	CPE	BPRATE	ONECERT	TFR
Beijing	1256	64.7	549	96.51	273	423	72.1	83.99	0.75	89.02	75.5	1.58
Tianjin	1272	68.7	687	97.88	226	309	71.1	81.61	0.73	90.20	82.6	1.74
Hebei	364	13.7	282	98.39	157	142	70.7	67.86	0.76	72.99	34.1	2.73
Shanxi	378	21.0	162	99.75	134	182	67.9	73.19	0.78	61.07	16.1	2.37
Neimonggu	320	28.9	16	84.45	201	171	67.1	66.02	0.71	63.88	36.7	2.72
Liaoning	710	42.4	245	91.85	157	174	70.9	81.95	0.82	87.84	70.8	1.82
Jilin	418	39.6	120	91.89	125	164	69.1	75.99	0.82	87.86	40.9	1.85
Heilongjiang	586	40.1	69	95.06	236	168	68.5	75.62	0.85	70.64	35.2	2.11
Shanghai	2520	58.8	1913	99.58	431	396	70.3	82.50	0.78	92.92	78.1	1.28
Jiangsu	498	15.8	590	99.82	259	117	69.7	62.21	0.83	78.32	59.0	2.02
Zhejiang	464	25.7	382	99.58	142	100	69.0	66.15	0.75	70.71	26.5	1.94
Anhui	305	14.2	356	99.47	154	89	69.3	50.21	0.79	63.94	18.3	3.16
Fujian	354	21.2	213	99.03	123	93	68.7	60.40	0.79	65.95	15.5	2.83
Jiangxi	326	19.4	199	99.93	130	115	66.2	65.06	0.76	69.56	7.0	2.75
Shandong	403	19.1	486	99.45	141	98	70.2	60.14	0.81	82.28	54.2	2.20
Henan	291	14.5	446	98.93	114	98	69.8	59.63	0.79	62.84	20.6	2.72
Hubei	418	17.3	255	96.28	141	142	65.8	65.70	0.78	73.72	40.5	2.38
Hunan	342	14.2	257	95.92	115	119	65.8	73.54	0.76	63.54	17.3	2.91
Guangdong	475	18.6	301	98.22	148	115	71.2	75.16	0.73	68.73	12.8	3.17
Gunagxi	267	11.8	158	61.74	155	104	70.2	72.93	0.56	60.53	10.3	4.04
Sichuan	282	14.3	176	96.33	102	120	64.5	64.91	0.79	71.56	50.9	2.35
Guizhou	203	18.9	162	74.00	101	95	62.0	49.43	0.64	55.62	11.7	4.25
Yunnan	261	13.0	83	68.29	138	117	61.4	48.22	0.55	56.45	16.2	3.86
Shaanxi	297	19.0	141	99.54	118	145	65.3	64.02	0.79	66.02	34.4	2.32
Gansu	296	15.3	43	92.05	133	133	66.1	49.09	0.79	60.39	16.7	2.75
Qinghai	328	20.5	5	60.58	125	180	61.4	50.96	0.51	51.86	9.7	3.97
Ningxia	332	22.5	59	68.06	139	154	66.0	54.11	0.77	65.65	29.3	3.95
Xingjiang	389	28.4	8	40.39	213	184	61.5	66.43	0.69	56.00	11.3	4.18

Note: for data source and variable description see page 6, Table 1.

Appendix 2 Values for the Total Fertility Rate, 8 Socio-economic Development Variables and 3 Family Planning Variables for 28 Provinces of China, 1990

PROVINCE	PINCOME	URBAN	DENSITY	HANPOP	RCONS	DOCTOR	TLIFE	TLIT	CPE	BPRATE	ONECERT	TFR
Beijing	3574	73.4	644	96.17	869	482	73.6	89.09	0.80	95.82	78.78	1.44
Tianjin	2982	69.6	777	97.69	420	369	72.7	88.40	0.81	97.06	70.31	1.61
Hebei	1148	19.2	325	96.06	270	143	71.7	78.38	0.84	88.60	39.70	2.48
Shanxi	1114	28.8	184	99.71	170	209	69.5	84.19	0.87	83.51	71.97	2.44
Neimonggu	1089	36.3	18	80.58	278	211	66.8	78.32	0.86	92.15	38.19	2.13
Liaoning	2011	51.3	270	84.37	238	219	70.8	88.49	0.85	99.11	62.50	1.70
Jilin	1383	42.3	132	89.76	188	200	68.3	85.70	0.86	95.54	55.30	1.87
Heilongjiang	1628	48.0	78	94.32	290	203	68.0	85.07	0.87	82.04	57.79	1.91
Shanghai	4822	66.2	2118	99.53	790	449	75.3	86.48	0.83	99.39	82.37	1.42
Jiangsu	1696	21.6	654	99.77	430	148	72.2	77.26	0.87	87.09	73.57	2.01
Zhejiang	1717	31.2	407	99.49	291	138	72.3	77.05	0.88	94.85	51.35	1.59
Anhui	933	17.8	404	99.42	261	105	69.9	65.65	0.85	77.71	31.79	2.49
Fujian	1313	21.4	248	98.45	224	120	70.2	76.85	0.87	62.95	34.87	2.57
Jiangxi	943	20.4	226	99.73	200	137	66.7	75.91	0.87	75.95	24.73	2.62
Shandong	1362	27.3	539	99.40	201	126	71.2	76.99	0.87	89.25	58.29	2.11
Henan	880	15.2	512	98.82	189	117	70.2	76.92	0.87	84.61	34.32	2.90
Hubei	1248	28.8	290	96.03	270	163	67.5	77.69	0.85	82.91	42.63	2.46
Hunan	976	18.0	286	92.05	146	136	67.2	83.01	0.85	69.93	32.97	2.43
Guangdong	1845	36.8	353	99.43	247	131	73.1	84.94	0.85	83.84	34.16	2.48
Guangxi	798	14.9	178	60.76	316	123	69.3	83.75	0.80	82.58	23.11	2.71
Sichuan	896	20.2	188	95.44	178	142	67.1	78.75	0.87	91.05	65.85	2.00
Guizhou	654	19.2	184	65.29	134	112	65.1	63.27	0.81	76.27	20.83	3.03
Yunnan	954	14.9	94	66.58	217	143	64.0	62.53	0.74	78.39	25.20	2.67
Shaanxi	930	21.5	160	99.52	163	183	68.3	74.88	0.86	81.40	45.17	2.67
Gansu	927	22.0	49	91.70	363	148	67.5	60.83	0.85	85.30	39.70	2.30
Qinghai	1111	26.2	6	57.86	177	221	61.8	59.96	0.76	78.71	32.03	2.59
Ningxia	1029	26.0	90	66.73	197	194	68.2	66.52	0.78	75.05	36.95	2.60
Xinjiang	1374	32.5	9	37.58	332	226	65.1	80.48	0.57	80.16	32.15	3.13

Note: for data source and variable description see page 6, Table 1.

Appendix 3 Values for Male and Female Life Expectancy at Birth, Literacy Rate

and Non-agricultural Employment Rate for 28 Provinces of China, 1981 & 1990

PROVINCE	1981 MLIFE	1981 FLIFE	1981 MLIT	1981 FLIT	1981 MNOAGR	1981 FNOAGR	1990 MLIFE	1990 FLIFE	1990 MLIT	1990 FLIT	1990 MNOAGR	1990 FNOAGR
Beijing	70.6	73.6	91.73	76.16	77.36	72.44	72.2	75.1	94.63	83.14	83.24	77.40
Tianjin	70.1	72.2	91.07	71.95	70.14	71.69	71.6	73.9	94.66	81.97	71.57	68.69
Hebei	69.3	72.1	80.92	54.28	26.54	18.89	70.0	73.6	87.26	69.31	26.17	18.08
Shanxi	66.8	69.1	82.48	63.09	37.60	21.24	68.0	71.2	89.90	78.02	39.24	27.89
Neimonggu	66.2	68.1	76.32	54.56	35.81	29.54	65.9	68.0	85.61	70.37	36.83	32.76
Liaoning	69.8	72.1	89.11	74.52	57.89	55.72	69.5	72.2	93.42	83.38	51.96	48.92
Jilin	68.4	69.9	83.54	68.05	42.93	51.58	67.0	69.9	90.53	80.67	41.66	42.73
Heilongjian	67.6	69.5	84.24	66.55	50.19	59.95	66.7	69.7	90.53	79.33	45.59	48.99
Shanghai	70.8	75.4	92.27	72.91	81.74	70.00	73.2	77.4	94.04	78.63	90.42	84.52
Jiangsu	67.7	71.9	78.83	55.24	44.92	26.61	69.9	74.6	87.95	66.35	38.91	31.43
Zhejiang	68.1	69.9	79.21	52.07	37.12	43.18	70.3	74.6	86.72	66.87	37.51	40.46
Anhui	67.7	70.9	67.55	31.59	24.18	13.61	68.1	71.7	78.84	51.70	22.31	14.97
Fujian	66.5	71.0	80.11	39.56	33.46	25.70	68.2	72.4	89.40	63.72	35.27	27.55
Jiangxi	64.9	67.6	81.24	47.70	32.14	19.46	65.6	67.9	87.65	63.41	24.73	18.70
Shandong	68.8	71.8	76.28	43.79	27.39	19.46	69.5	73.0	86.70	67.15	25.45	16.36
Henan	68.0	71.6	74.26	44.63	20.64	11.42	68.2	72.3	85.87	67.72	21.33	13.08
Hubei	64.3	67.5	80.35	50.26	31.24	20.66	65.8	69.4	87.47	67.31	30.36	24.30
Hunan	64.6	67.2	85.40	60.65	25.33	16.15	65.9	68.7	90.83	64.54	22.39	17.06
Guangdong	68.7	73.9	90.07	59.85	32.58	24.80	70.5	75.7	94.19	75.45	42.00	36.45
Guangxi	68.5	72.1	86.80	58.11	19.60	11.57	68.4	70.1	92.48	74.26	19.30	13.36
Sichuan	63.5	65.5	78.34	50.51	21.66	12.71	66.0	68.3	87.04	69.88	20.82	13.81
Guizhou	61.7	62.2	68.55	29.36	18.22	10.95	64.3	66.0	78.56	46.84	17.77	10.88
Yunnan	60.6	62.2	63.64	32.52	20.25	10.54	62.8	65.1	75.53	48.83	19.80	11.32
Shaanxi	64.5	66.2	75.79	51.36	29.51	18.39	67.1	69.7	83.61	65.49	28.08	19.17
Gansu	65.4	66.9	65.30	31.55	24.68	13.29	66.9	68.3	73.74	46.94	23.87	14.23
Qinghai	60.4	62.4	66.83	33.97	38.78	24.12	60.8	62.9	73.09	45.60	36.71	24.07
Ningxia	65.1	66.8	68.58	38.53	33.03	19.55	67.3	69.3	77.53	54.88	32.49	21.75
Xingjiang	61.1	61.9	72.37	60.06	41.17	30.24	64.4	65.7	84.20	76.45	36.40	30.22

_Note: for data source variable description see page 6.

Appendix 4 - The Computation of Contraceptive Prevalence/ Effectiveness (CPE) Rate: Beijing, 1989

Type of Contraception	% married fecund women aged 15-49 currently contracepting (u)	Contraception use effectiveness (e)	(u×e)
IUD	49.22	0.963	47.40
Pill and injections	11.51	0.949	10.92
Condom	15.03	0.616	9.26
Male sterilization	0.47	1.000	0.47
Female sterilization	10.39	1.000	10.39
External methods	1.15	0.798	0.92
Other	0.95	0.700	0.67
Total	88.72		80.03

CPE = 80.03/100 = 0.80

Source: Poston and Gu (1987);
China Population Information Handbook (1990).

Appendix 5 Path Coefficients and t-tests Values for Regressions of Total Fertility Rate on Socio-economic Development, Women's Status and Family Planning Efforts, and of Family Planning Efforts on Socio-economic Development and Women's Status

Independent	**Dependent: total fertility rate**					
	Model 1			**Model 2**		
	β	t	P>|t|*	β	t	P>|t|
Development	-.18	-1.26	.220	-.31	-2.40	.024
Women's status	-.07	-0.65	-.523	-.14	-1.33	.197
Family planning	-.72	-4.97	.000	-.57	-4.46	.000
R^2(adj)		0.79			0.79	
	Dependent: family planning efforts					
	Model 1			**Model 2**		
	β	t	P>|t|	β	t	P>|t|
Development	.69	4.87	.000	.61	3.83	.001
Women's status	.17	1.17	.252	.18	1.14	.265
R^2(adj)		0.59			0.48	

Note: * 95% confidence interval.