Population policy, economic development, and low fertility in Guangdong province, China, 1975-2005

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Introduction

The relative importance of the one-child policy and economic reform, in terms of their effects on China's fertility decline, has been debated for years. Guangdong province is of particular interest because its fertility decline lagged behind the national average for about two decades after 1979, despite faster economic growth than that of any other province. The combination of rapid development and relatively high fertility in Guangdong has puzzled policy makers and demographers both inside and outside of China. This paper sheds light on this puzzle by analyzing how both fertility policy and economic development have affected the trend in fertility in Guangdong during the period 1975–2005.

The analysis is based on microdata samples from the 1990 and 2000 censuses and 2005 mini-census. Trends in total fertility (TFR) are estimated for both Guangdong and all-China. A decomposition analysis of change in the TFR in Guangdong provides further insights. Change in the TFR is decomposed into a sum of three components: the first due to change in population composition by a socioeconomic characteristic (residence, education, or migration status), the second due to changes in age-characteristic-specific proportions currently married, and the third due to changes in age-characteristic-specific marital fertility rates. It is argued that the first two of these three components of change in TFR resulted mainly from economic and social development. The third component is influenced by both development and the one-child policy.

Data

The fertility estimates for China and the province of Guangdong are derived from one-percent samples from China's 1990 and 2000 censuses and a 20-percent systematic sample from China's 2005 National one-percent Population Sample Survey, referred to here as the 2005 mini-census. The one-percent samples from the 1990 and 2000 censuses were obtained by selecting 10 percent systematic samples from the 10 percent samples containing long-form information on fertility, marital status, urban/rural residence, migration, education, and occupation. Information on age at first marriage is available in the 2000 census and 2005 mini-census but not in the 1990 census.

Trends in total fertility (TFR) are estimated for the whole China and for the province of Guangdong as a whole as well as by region (Delta, non-Delta). Fertility in Guangdong is also estimated by residence (city, town, rural), education (elementary or lower, middle school, high school or higher), occupation (administrative/professional, service, farming, operator/laborer, homemaker, unemployed, other), and migration status (migrant, non-migrant). In the 1990 census, occupation is defined as current occupation, and in the 2000 census and 2005 mini-census, it is defined as occupation in the week before the census. Despite some differences in definition, occupational categories are comparable between the three censuses. Because occupation can change over time and because occupation is specified only at the time of the

census, our fertility estimates by occupation are presented only for the year before each census. Students, among whom births are rare, are excluded from the occupational classification.

The analysis employs two definitions of migration status that are applicable to both the 1990 and 2000 censuses and the 2005 mini-census: provincial-level migration status and regional-level migration status. In the provincial-level definition, non-migrants are registered persons (i.e., registered in the household registration system) who already lived in Guangdong five years ago before the census. All other persons are defined as migrants. In the regional-level definition of migration status, non-migrants are persons in either the Delta region or the non-Delta region who were registered at the time of the census in the county where they were currently living at the time of the census. To be classified as regional-level non-migrants they must also have been living in the same county five years ago (if enumerated in the 1990 or 2000 census) or anywhere in Guangdong province five years ago (if enumerated in the 2005 mini-census). All other persons are defined as migrants.

Methods

Fertility estimates are calculated from individual- and household-level census data by making use of the birth history reconstruction (BHR) method, which is an extension of the own-children method (Cho et al. 1986). The BHR method starts with incomplete birth histories corresponding to "own children", defined as children matched to the mother within the same household. The year of birth of each own child is derived from the child's age at the time of the census, yielding an "own children" birth history for the mother that may be incomplete, due to missing information on dead children or children living in some other household.

The difference between a woman's number of children ever born (an essential piece of information that is available from China's censuses) and the number of own children matched to her equals the number of births that are missing from the own-children birth history. These missing births are imputed using probabilistic procedures developed by Luther (Cho et al. 1986; Luther and Cho 1988; Luther et al. 1990; Retherford and Luther 1996) to produce a complete reconstructed birth history. For any particular woman, the complete reconstructed birth history is in general only approximately accurate in terms of the year of birth assigned to an imputed birth. But when the birth histories are aggregated in the process of calculating fertility estimates, individual-level errors tend to cancel out, so that the fertility estimates are quite accurate when derived from large samples — unless, of course, other sources of error, such as undercount, under-reporting of children ever born, or age misreporting are also present. Fertility estimates are calculated from the reconstructed birth histories using methods developed by Feeney (Feeney and Wang 1993). The reconstructed birth histories allow computation of both age-specific fertility rates (ASFRs) and period parity progression ratios (PPPRs) for each of the 15 years prior to the census. Normally one does not go back more than 15 years, because a large fraction of children age 15 or older at the time of the census no longer live in the mother's household and therefore cannot be matched to mothers.

In this paper, we denote the PPPRs and the parity transitions to which they pertain as

p_B Woman's own birth to parity 1 (B–1)

p_1 Parity 1 to parity 2 (1–2)
p_2 Parity 2 to parity 3 (2–3)
p_3 Parity 3 to parity 4 (3–4)
etc.

Total fertility TFR (births per woman over the entire reproductive life span) can be calculated from either ASFRs or PPPRs. TFR_{asfr} is calculated in the usual way as five times the sum of the ASFRs in 5-year age groups. TFR_{pppr} is calculated from PPPRs using the formula

$$TFR_{pppr} = p_B + p_B p_1 + p_B p_1 p_2 + p_B p_1 p_2 p_3 + p_B p_1 p_2 p_3 p_4 + \ldots \quad (1)$$

When using equation (1), PPPRs are specified out to the highest parity observed.

The decomposition method used here was developed by Retherford and Ogawa (1978) and Retherford et al. (2004), who adapted the methodology originally developed by Kitagawa (1955). The method is briefly recapitulated as follows, with residence as the socioeconomic characteristic. Consider a change in $TFR_{asfr} = 5\sum_x F_x$, where F_x is the age-specific birth rate for the 5-year age group beginning at age x. F_x can be expressed as a weighted sum of age-residence-specific birth rates (F_{xr}), where each weight k_{xr} is the proportion of women in the age group x to x+5 with residence r (city, town, or rural). F_{rx} can be expressed in turn as a weighted sum of age-residence-marital status-specific birth rates (F_{xrm}) for women in the x-r^{th} age-residence group, where the weights are the proportions of women in each marital status category within that age-residence group (k_{xrm}). This leads to the formula

$$TFR_{asfr} = 5\sum_{x,r}\left\{k_{xr}\sum_m\left[k_{xrm}F_{xrm}\right]\right\} = 5\sum_{x,r,m} k_{xr}\,k_{xrm}\,F_{xrm} \quad (2)$$

The final formula for decomposing the change in the TFR_{asfr} is then

$$\Delta TFR_{asfr} = 5\sum_{x,r}\overline{F_{xr}}\Delta k_{xr} + 5\sum_{x,r}\overline{k_{xr}}\,\overline{F_{xrm}}\Delta k_{xrm} + 5\sum_{x,r}\overline{k_{xr}}\,\overline{k_{xrm}}\Delta F_{xrm} \quad (3)$$

where the symbol Δ denotes change, F_{xrm} is redefined as an age-residence-specific marital fertility rate, and $\overline{k_{xr}}$ and $\overline{F_{xrm}}$ are average values over the period. The age-specific marital fertility rates (ASMFRs) F_{xrm} are derived by dividing the age-specific fertility rates within each age-residence group by the age-specific proportion currently married in the age-residence group, on the assumption that all fertility occurs within marriage (a reasonable assumption for China). The first of the three principal terms on the right side of the equation denotes the contribution to change in TFR_{asfr} from changes in residence composition within age groups. The second term denotes the contribution from changes in marital status composition within age-residence groups. The third term denotes the contribution from changes in marital status-specific fertility rates within age-residence groups. The terms for currently not-married women drop out of the decomposition formula, because the fertility of these women is zero. Because of this, the second component in equation (3) can be restated as resulting from changes in age-residence-specific proportions currently married, and the third component can be restated as resulting from changes in age-residence-specific marital fertility rates.

The decomposition methodology is used to analyze changes in TFR_{asfr} in the Delta region, non-Delta region, and Guangdong province as a whole over the time period 1990–2000. Decompositions are shown for the period 1990–2000 only, because there was little change in TFR_{asfr} between 2000 and 2005. The decomposition methodology is also used to analyze differences in TFR_{asfr} between the Delta and non-Delta regions in 1990, 2000, and 2005. Similar decompositions are also done with education and migration status substituted for residence in the above formulae.

Findings

The analysis clearly shows the influence of fertility policy on the fertility trend, inasmuch as fluctuations in the trend correlate in expected ways with changes over time in the way that China's one-child policy has been implemented in the province. The differences in fertility trends between Guangdong and China as a whole also correlate in expected ways with differences between Guangdong and most of the rest of China in the way that the one-child policy has been implemented.

Economic development has also contributed to Guangdong's fertility decline, much as it has in other countries that have undergone fertility transition. The analysis shows that economic development has brought about large changes in population composition by urban/rural residence, education, occupation, and migration status, which, together with large fertility differentials by these characteristics, have contributed substantially to Guangdong's fertility decline, in large part through changes in proportions currently married. Although marriage and fertility policy clearly have had a major effect on the trend in Guangdong's fertility, the decomposition analysis of change in TFR_{asfr} suggests that at least half of the substantial decline in TFR_{asfr} between 1990 and 2000 occurred as a consequence of economic and social development.