TRENDS IN EDUCATIONAL GENDER INEQUALITY IN CHINA: 1949-1985

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ABSTRACT

Since the founding of the People's Republic of China in 1949, the Chinese government's goals of equality and development have proven difficult to reconcile, resulting in periods distinguishable by varying combinations of government concerns with economic development and social equality. A primary objective of this paper is to establish the link between educational gender inequality and political climate by examining the extent to which shifts between egalitarianism and economic growth as primary governmental concerns have affected women's relative educational position in China. Specifically, with aggregate data from the 10 percent sampling tabulations of the 1990 China Census and unit-record data from the 1985 China In-Depth Fertility Surveys in Hebei, Shaanxi, and Shanghai, we apply spline-smoothing regressions to model the trends in gender differences in transitions to elementary and junior high schools. It is found that periods with a strong emphasis on equality are indeed characterized by sharp decreases in gender stratification, while periods with a focus on economic development are characterized by increases or slow decreases in gender stratification. There is little evidence for an alternative explanation that the sharp declines in gender stratification have resulted from parallel declines in fertility.

Research in Social Stratification and Mobility, Volume 13, pages 73-98.

ISBN: 1-55938-711-4

INTRODUCTION

Since the founding of the People's Republic of China (PRC) in 1949, the Chinese government has professed a commitment to establishing an egalitarian society that also delivers material prosperity. From a functionalist viewpoint (e.g., Lipset and Bendix 1964, chapter 2; Blau and Duncan 1967, pp. 425-431), these dual goals appear complementary: the efficiency of a complex modern economy is said to hinge on conditions of equal opportunity in the sense that vacancies in the occupational structure should be matched with the most qualified workers in the labor force. In the experience of China, however, these divergent goals have proven difficult to reconcile, resulting in periods distinguishable by varying combinations of government concerns with economic development and social equality.

The difficulty in reconciling the dual goals of equality and development is rooted in two basic dilemmas facing the Chinese government. First, economic development has depended on inequality of outcome as an incentive, which has invited criticism for deviating from the socialist commitment to egalitarianism. Second, the Chinese government has been constrained by meager capital and human resources. Economic scarcity has dictated that rapid economic development compete directly for resources with expansion of opportunities to traditionally disadvantaged groups. Thus, in the past four decades China's leaders have prioritized either social equality or economic development in formulating social and economic policies.

Radical reforms of China's educational system since 1949 have mirrored the fluctuating political focus, as Chinese leaders alternately favored egalitarian or competitive educational models (Arnove 1984, p. 400). The egalitarian model emphasizes environment (as opposed to inborn talent), favors a cooperative (as opposed to a competitive) educational atmosphere, and advocates the extension of equal opportunities and a uniform curriculum to students in all social groups (Thomas 1986, pp. 301-307). The competitive model, in contrast, relinquishes excessive concerns with equality in favor of producing specialists and technical experts to meet the immediate needs of rapid economic growth; it encourages student rivalry and personal advancement and justifies nonuniform availability of education and diverse curricula as a means of maximizing economic returns to the government's educational investments (Broaded 1983, pp. 128-129; Kwong 1985; Thomas 1986).

Past research has well documented that educational gender inequality has generally declined in modern societies (Blossfeld and Shavit 1993, p. 13). As we will show in this paper, this general trend towards lesser gender inequality holds true also in China, although the trend there has been far from continuous or monotonic.[1] In trying to explain the temporal changes (and lack thereof) in educational gender differentials in modern Chinese history, we resort to a

sizeable body of literature that elucidates implications for education and educational inequality of China's various political periods (e.g., Unger 1980; Sidel 1982; Broaded 1983; Kwong 1985; Thomas 1986; Davis 1989; Bergen 1990). While this literature suggests, albeit often implicitly, that educational gender stratification has been influenced by changes in political climate in China, no attempt so far has been made to systematically relate the two. Lacking this knowledge, we can neither explain social mechanisms that have driven the general trend towards decreasing educational gender inequality in China's past nor predict with much confidence the implications of the on-going economic reforms in China for gender inequality.

A primary objective of this paper is to establish the link between educational gender inequality and political climate by examining the extent to which shifts between egalitarianism and economic growth as primary governmental concerns have affected women's relative educational position in China. Specifically, we expect gender differentials to decline for periods with a significant stress on equality and to increase or hold steady for periods when the government placed priority on rapid economic development. In order to evaluate this hypothesis, we delineate historical time since 1949 into periods based on clear-cut shifts in political climate and model trends in the gender gap in elementary and junior high school educational attainment with spline-smoothing regressions.

DATA

Data for this study came from two sources. Time-series data on national rates of educational attainment were obtained from the 1990 China Census 10 percent sampling tabulations by single years of age, four levels of educational attainment (elementary, junior high, senior high, and college), and three types of residence status (city, town, and rural).[2] These aggregate data were supplemented by unit-record data from the 1985 China In-Depth Fertility Surveys (phase 1) in Hebei (n=5,080), Shaanxi (n=4,084), and Shanghai (n=4,143) (hereafter CIFS). The CIFS were conducted using a stratified, multistage design with a target population of ever-married women under the age of 50. To minimize possible biases due to the exclusion of unmarried women, we restricted the age of CIFS respondents to 26 to 50, as a vast majority (about 95%) of Chinese women are married by the age of 26 (Population Census Office 1991, p. 408). We further extended the data set by extracting additional person records from information pertaining to the main respondent's husband (if also aged 26 to 50) and children, thus obtaining an augmented sample of 35,847 observations (14,212 for Hebei, 11,819 for Shaanxi, and 9,816 for Shanghai).[3] For both the data sets, we collapsed city and town into a combined category of urban.

We limit the study to transitions to elementary and junior high school for a methodological reason: we impute the political period of influence retrospectively from data collected in 1990 and 1985 by taking advantage of the fact that ages for making such transitions have been stable. By comparison, the timing of transitions to higher levels of education (i.e., senior high school and college) is much more difficult to ascertain, as some students may have waited for a couple of years before they continued to the next level of education either because schools were temporarily unavailable or because the students did not do well enough on entrance exams. (Entrance exams have normally been required to enter senior high schools and colleges.) This is further complicated by variations in the primary-secondary education duration (to be explained in the next section) and the closing down of virtually all colleges and universities early in the Cultural Revolution.

There is reason to believe that trends in transitions to lower levels of education are no less (if not more) interesting than those to higher levels of education. Mare (1980) shows that educational stratification (at least with respect to family background) is stronger for transitions at lower levels than those at higher levels. For the case of educational gender inequality in China's past, Lavely, Xiao, Li, and Freedman (1990, p. 87) also find that convergent trends in gender inequality have been much sharper at lower levels of education than those at higher levels of education, "mainly due to the fact that there was relatively little sexual inequality in progression at higher levels historically." Our current research strategy mimics that of Mare (1980) in that we decompose the process of attaining junior high education into two parts: (1) attaining elementary education and (2) attaining junior high education conditional on receiving elementary education.

In order to examine trends over time in transitions to elementary and junior high school, we have recoded the age variable into the typical year of educational transition using the following formula:

$$\begin{array}{lllll} \text{Transition} & = & \text{Survey} & - \text{ Age in} & + \text{ Typical Age} \\ \text{Year} & & \text{Year} & \text{Survey Year} & \text{of Transition} \end{array} \qquad (1)$$

We set the typical age of transition to elementary school at seven and to junior high school at thirteen. In this way, we can ascertain retrospectively the political period during which a transition to elementary or junior high school education occurred. With the coding scheme of equation (1), we implicitly assume that the year at start of an educational level was the time at which parental decisions were most significantly affected by policy-related factors.[4]

CLASSIFICATION OF POLITICAL PERIODS IN CHINA

China's educational system has undergone numerous changes since the establishment of the PRC. In general, the system can be characterized by five

to six years of elementary school, two to three years of junior high school, and two to three years of senior high school. In the early economic recovery period, six-three-three was the ideal sequence. Experiments to quickly widen the educational base during the Great Leap Forward gave rise to five-three-two and five-two-two systems in some areas, while the Cultural Revolution unified and streamlined the system to five-two-two. Since the Cultural Revolution, the normative education system has reverted to six-three-three (Hu and Seifman 1987, pp. 26-28). Below, we briefly summarize changes in the political climate and their educational implications in modern China, focusing on the tension between facilitating rapid economic development and promoting social equity.

Economic Recovery Period: 1949-1957

The political orientation during the PRC's early period emphasized both economic development and social equality. China's first five-year plan specified that large numbers of specialists would be required by the modernizing economy and that the most cost-effective approach was to concentrate limited funding on the educational infrastructure in urban areas (Unger 1980, p. 223; Lo 1984). Despite this heavy emphasis on development, the government implemented policies that drastically increased low-level educational opportunities and reduced illiteracy, especially among women and peasants (Arnove 1984, p. 382; Lavely et al. 1990, pp. 66-71; Bauer, Wang, Riley, and Zhao 1992). Many new schools, mostly at elementary and junior high levels, were opened during this period (Fan 1990). Additionally, newly introduced marriage and labor laws improved the social status of women and peasants (Croll 1979, pp. 3-7). Finally, collectivization during this period detracted from traditional intergenerational dependencies and thus reduced the economic value of sons relative to daughters. In sum, this period had mixed implications for educational gender inequality, although we expect the overall benefit for females to exceed that for males due to strong institutional forces favoring female participation in education.

Great Leap Forward: 1958-1960

The Great Leap Forward movement espoused rapid economic development, but from a radical leftist standpoint. Rather than relying on technical specialization, it was hoped that mass labor in simple production processes would lead to a rapid transformation of the backward economy, huge increases in agricultural production, and lasting national prosperity. In line with this approach, educational policy during the Great Leap Forward focused on basic education. Many work-study and part-time schools tailored to rural life were opened in the countryside. Experimental nine- and ten-year school systems

were implemented in urban areas in order to expand educational opportunities. Though initially touted as bridging the gap between privileged and non-privileged classes, such model programs proved inferior to the traditional urban academic system in curricula, funding, length of schooling, and graduates' access to colleges and universities (Unger 1980, pp. 224-234). The reforms of this period were later labeled a "reprint" of the tracking system in capitalist countries, in which laborers and learned classes were trained differently (Unger 1980, p. 231).

While efforts were made to broaden the educational base during the Great Leap Forward, the unsuccessful attempt at rapid economic development led to an economic collapse and the nationwide Great Famine (1959-1961). As a result, in facing grave economic difficulties many more parents than in the earlier period kept children out of school to help support families and reduce family expenses. Given traditional preferences for sons over daughters, it is likely that the economic hardship of this period impeded girls' educational advancement more than boys'.

Transition: 1961-1966

The Great Famine and the accompanying economic crisis exacerbated male-female differentials in educational attainment. During the period of adjustment immediately following the Great Famine, disagreements emerged among Chinese leaders. In the area of education, these disagreements were reflected in a struggle between the Maoist egalitarian view and an alternative view that limited resources should be spent where most effective, such as urban key-point schools, in order to produce the qualified experts needed for modernization of the economy. The latter view gained prominence over time, until the beginning of the Cultural Revolution (Epstein 1990, p. 102; Gai 1990, p. 197).

Cultural Revolution: 1967-1976

One of the stated objectives of the Cultural Revolution was to eliminate urban-rural, worker-peasant, and mental-manual differences (Sun and Johnson 1990, p. 212; Thomas 1986, p. 305). In the realm of education, the government implemented policies consistent with this objective, such as eliminating the tracking system (Hu and Seifman 1987, p. 24; Rosen 1984, p. 69), abandoning key-point schools, and abolishing entrance examinations. Not only was the number of years spent for primary and secondary education reduced, but emphasis was also placed upon labor and political loyalty over academic achievement, and all students were expected to participate in two or more years of manual labor upon graduation from high school. In addition, educational credentials became largely irrelevant to job assignments (Unger 1984). While the first few years of the Cultural Revolution were chaotic, the

egalitarian political climate of this period ultimately had an equalizing effect on educational differentials between men and women.

Economic Reforms: 1977-1985

Prompted by the floundering economy, a reexamination of national goals shifted attention to the production of a technocratic elite considered critical to China's economic development. Deng Xiaoping (1983, pp. 37-38) decreed that knowledge and education were to be respected and to serve as foundations for the Four Modernizations (industry, agriculture, science/technology, and national defense). This strategy was justified with a new interpretation of socialism stating that minimizing social differences could be best achieved by elevating the living standards of the entire society with material resources (Sun and Johnson 1990, p. 213). Leaders began to view individual incentives as a useful stimulant and free competition as an effective tool.

Educational policies reflected this emphasis on economic modernization with a return to the competitive educational model. In addition to the reinstituting of systematic examination systems, new educational policies included the reestablishment of key-point schools at various administrative levels (e.g., district, county, and municipal) and key-point classes in many schools, the elimination of certain inferior secondary schools, and the expansion of technical and agricultural secondary schools (Mauger 1983; Bastid 1984; Lewin and Xu 1989). Schools in rural areas were underfunded and understaffed compared to schools in urban areas, especially those in cities of strategic importance to modernization. Costly expansion of quality primary and secondary education to rural areas was halted or even retracted. Moreover, school fees increased at a time when opportunity costs for educating children in the countryside were rising due to privatization of agricultural economy (Davis 1989; Lewin and Xu 1989). Hence, minimizing social differentials and expanding opportunities had taken a back seat to economic development, giving rise to a decline in enrollment rates of school-age children at primary and secondary levels and a major expansion at the tertiary level of education (Davis 1989, pp. 581-583).

EDUCATION IN RURAL AND URBAN CHINA

Incentives for education in rural China differ radically from those in urban China due to several institutional differences. Financially, peasants receive virtually no provision from the state and are therefore utterly reliant on offspring for financial support in their old age. In contrast, most urban workers are employed by the state with guaranteed retirement pensions; and elderly urban workers are said to be more likely to contribute to, than to take from,

their children's financial well-being. Finally, rural parents incur a greater opportunity cost than their urban counterparts for sending children to school, as rural children can contribute labor from very early ages and expect low economic returns to education (Byron and Manaloto 1990; Peng 1992).

Cultural factors also work to exacerbate gender inequities in rural China. Traditional family ideals which favor boys over girls are generally stronger in rural than in urban areas. Most notably, marriage occurs at younger ages and is more likely to result in coresidence with the husband's family in rural areas. For rural daughters, early marriage means leaving their parents' home before parents could expect to receive significant benefits from their education. Boys are better investments, as parents are much more likely to benefit from their education either in the form of coresidence or through financial support in the retirement years. Thus, traditional coresidence practices have created a persistent and rational motivation for favoring sons over daughters in rural China (Croll 1985, pp. 11, 17; Davin 1985, pp. 41-42). Although these factors are also present in urban China (Bauer et al. 1992), their influence on parental behavior of educating sons versus educating daughters is significantly smaller. As reported by Lavely, Xiao, Li, and Freedman (1990, pp. 61-73), for example, female advancements in education at elementary and secondary levels have occurred earlier and been relatively stable in urban areas compared to rural areas.

ANALYSIS

We divide the analysis into four sections. First, descriptive evidence is presented on the association between political emphasis and the gender gap in educational outcomes. Second, with macro-level tabular data from the 1990 China Census, national urban and rural trends in gender inequality are modeled using spline-smoothing, time-series regressions with log-odds-ratio measures of transitions to elementary and junior high school as dependent variables. Third, parallel spline-smoothing logistic regressions are estimated with individual-level data from CIFS (Hebei, Shaanxi, and Shanghai). In the fourth and final section, the contribution of fertility decline to trends in educational gender inequality is considered in a cross-sectional analysis with a subsample of the CIFS data.

Trends in Educational Opportunity and Attainment

As reported by Lavely, Xiao, Li, and Freedman (1990) and Bauer, Wang, Riley, and Zhao (1992), women's position in the Chinese education system has greatly improved since 1949, notably in the primary levels during the 1950-1958 period and in secondary levels during the Cultural Revolution.[5] In Table 1,

Table 1. Trends in Number of Schools, Enrollment, and Gender Composition of Enrolled Students at Elementary and Secondary Levels in Modern China

		Elementary Level			*Secondary Level*		
Political Period	*Year*	*Number of Schools* ($\times 10^3$)	*Enrollment* ($\times 10^6$)	*Percent Female*	*Number of Schools* ($\times 10^3$)	*Enrollment* ($\times 10^6$)	*Percent Female*
	1949	346.8	24.39	—	4.0	1.04	—
Economic	1950	383.6	28.92	—	4.0	1.30	26.52
Recovery	1951	501.1	43.15	27.95	4.0	1.57	25.59
	1952	527.0	51.10	32.87	4.3	2.49	23.53
	1953	512.1	51.66	34.50	4.4	2.93	24.36
	1954	506.1	51.22	33.33	4.8	3.59	24.98
	1955	504.1	53.13	33.43	5.1	3.90	26.91
	1956	529.0	63.47	35.16	6.7	5.16	29.32
	1957	547.3	64.28	34.47	11.1	6.28	30.81
	1958	776.8	86.40	38.49	28.9	8.52	31.26
Great Leap	1959	737.4	91.18	39.13	20.8	9.18	31.17
Forward	1960	726.5	93.79	39.08	21.8	10.26	31.20
	1961	645.2	75.79	27.48	19.0	8.52	32.23
Transition	1962	668.3	69.24	34.76	19.5	7.53	34.07
	1963	708.0	71.58	—	19.6	7.62	33.96
	1964	1066.0	92.95	34.97	19.2	8.54	34.14
	1965	1681.9	116.21	—	18.1	9.34	32.20
	1966	1007.0	103.42	—	—	12.50	—
	1967	964.2	102.44	—	—	12.24	—
Cultural	1968	940.6	100.36	—	—	13.92	—
Revolution	1969	915.7	100.67	—	—	20.21	—
	1970	961.1	105.28	—	—	26.42	—
	1971	968.5	112.11	—	—	31.28	—
	1972	1009.2	125.49	—	93.0	35.82	—
	1973	1031.7	135.70	40.73	97.3	34.46	32.99
	1974	1053.3	144.81	43.72	100.6	36.50	38.14
	1975	1093.3	150.94	45.21	123.5	44.66	39.27
	1976	1044.3	150.06	45.47	192.2	58.37	40.38

(continued)

Table 1. (Continued)

Political Period	Year	Elementary Level			Secondary Level		
		Number of Schools ($\times 10^3$)	Enrollment ($\times 10^6$)	Percent Female	Number of Schools ($\times 10^3$)	Enrollment ($\times 10^6$)	Percent Female
	1977	982.3	146.18	45.37	201.3	67.80	41.67
Economic	1978	949.3	146.24	44.93	162.3	65.48	41.47
Reforms	1979	923.5	146.63	44.86	144.2	59.05	40.82
	1980	917.3	146.27	44.56	118.4	55.08	39.58
	1981	894.1	143.33	43.96	106.7	48.60	39.00
	1982	880.5	139.72	43.66	101.6	45.28	39.25
	1983	862.2	135.78	43.73	96.5	43.98	39.45
	1984	853.7	135.57	43.80	93.7	45.54	40.00
	1985	832.3	133.70	44.77	93.2	47.06	40.23
	1986	820.8	131.83	45.14	93.0	48.90	40.65
	1987	807.4	128.36	45.36	92.9	49.48	40.80
	1988	793.3	125.36	45.59	91.5	47.62	40.98
	1989	777.2	123.73	45.88	89.6	45.54	41.44
	1990	766.1	122.41	46.20	87.6	45.86	41.87

Source: China Ministry of Education (1984, pp. 184-185, 202, 213, 223) and China State Education Commission (1986, pp. 64, 74, 80, 84; 1991, pp. 59, 69, 74, 78).

we present trend data for the number of schools, number of students enrolled in schools, and proportion of female students at the elementary and secondary school levels from 1949 to 1990. These figures confirm a steady growth in educational opportunities in the early PRC period, interruptions due to the Great Leap Forward and the Great Famine, an expansion during the latter part of the Cultural Revolution, and a contraction in the economic reform era. Overall, female participation in primary and secondary school education has significantly increased since 1949, although the increasing trend was disrupted during the early 1960s and slowed down with the economic reforms.

Figures 1 and 2 show changes in transition rates to elementary and junior high school by year, residency, and sex between 1949 and 1985, based on the 1990 Census tabular data. At the elementary level, there has been a relatively steady increase in overall attainment rates for all groups, while at the junior high school level there have been clear periods of stagnation and even decline for all groups during the Great Leap Forward and economic reform periods. Throughout these periods, however, males and urban residents were always advantaged compared to females and rural residents.

Trends in Gender Inequality

In order to trace patterns of change in the gender gap in education, we report results from time-series regressions modeling the trends in gender inequality over time. The dependent variable in this regression analysis is the log-odds-ratio (LOR) of transitions to elementary and junior high school:

$$\text{LOR} = ln\{Pr(T|\text{Male})/[1 - Pr(T|\text{Male})]\} - ln\{Pr(T|\text{Female})/[1 - Pr(T|\text{Female})]\}, \quad (2)$$

where $Pr(T|\text{Male})$ and $Pr(T|\text{Female})$ are transition rates conditional on sex. To test the hypothesis that gender inequality either increases or decreases monotonically during a period, we force the LOR of transition to follow a linear function with a flexible slope within each period. Because we believe that any social change can only be gradual, we also constrain the period-specific linear functions to be connected between two adjacent periods. This specification is commonly called a "spline-function." In these models, we estimate the regression models using the generalized least squares method correcting for first order autocorrelation.[6]

Table 2 presents four regression models of gender inequality in transitions to elementary and junior high school in rural and urban areas. The estimated model parameters, along with coefficients of determination and coefficients of autocorrelation, are reported. The intercept terms represent the initial conditions of gender inequality at the founding of the PRC in 1949. By our LOR measure, hence, the initial gender inequality was much larger for the

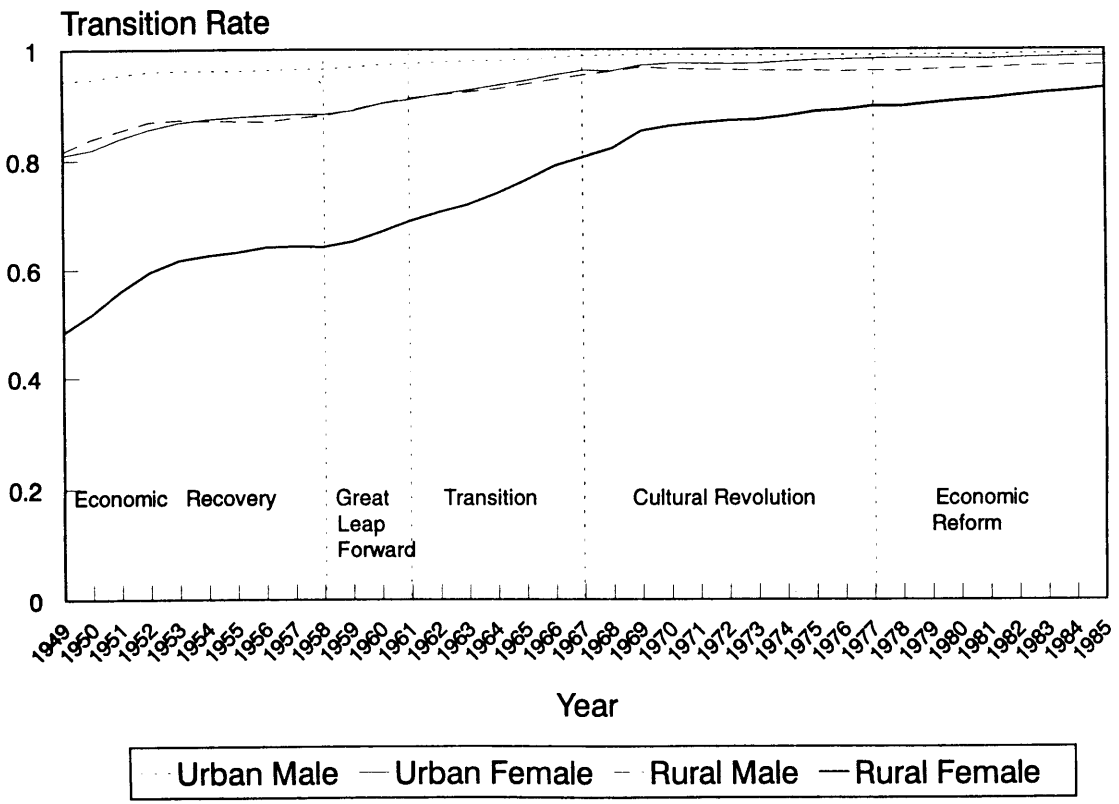

Figure 1. Trends in Transition to Elementary School

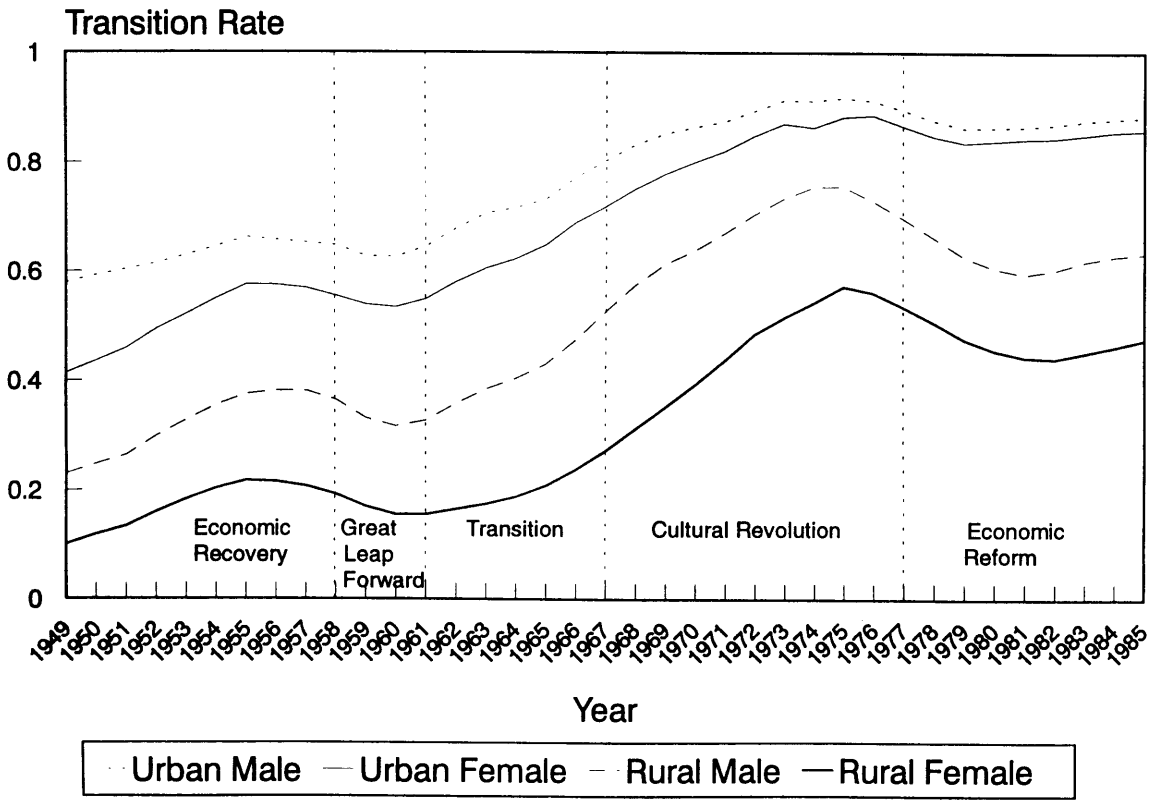

Figure 2. Trends in Transition to Junior High School

Table 2. Spline-Smoothing, Time-Series Regressions of Log-Odds-Ratio Measures of Gender Inequality in Transitions to Elementary and Junior High School Education

	To Elementary School		*To Junior High School*	
Variables	*Coefficients*	*(S.E)*	*Coefficients*	*(S.E.)*
Urban				
Intercept	1.377	(0.039)	0.588	(0.045)
Slope in 1949-1957 (×10)	-0.121	(0.068)	-0.296	(0.073)
Slope in 1958-1960 (×10)	0.231	(0.180)	0.267	(0.178)
Slope in 1961-1966 (×10)	-0.185	(0.095)	0.179	(0.102)
Slope in 1967-1976 (×10)	-0.675	(0.054)	-0.243	(0.063)
Slope in 1977-1985 (×10)	0.043	(0.071)	-0.102	(0.079)
ρ	0.505	(0.144)	0.694	(0.120)
R^2	0.996		0.961	
Durbin-Watson Statistic	1.582		1.317	
Rural				
Intercept	1.548	(0.042)	0.846	(0.042)
Slope in 1949-1957 (×10)	-0.185	(0.070)	0.001	(0.068)
Slope in 1958-1960 (×10)	0.518	(0.178)	0.602	(0.165)
Slope in 1961-1966 (×10)	0.151	(0.099)	0.132	(0.095)
Slope in 1967-1976 (×10)	-0.572	(0.059)	-0.436	(0.058)
Slope in 1977-1985 (×10)	-0.120	(0.075)	-0.088	(0.073)
ρ	0.639	(0.128)	0.700	(0.119)
R^2	0.991		0.983	
Durbin-Watson Statistic	1.340		1.046	

Note: ρ is the coefficient of first-order autocorrelation. R^2 is computed after the correction for first-order autocorrelation.

Source: *10 Percent Sampling Tabulation on the 1990 Population Census of the People's Republic of China* (Population Census Office 1991).

transition to elementary education (1.377 for urban and 1.548 for rural) than that for the transition to junior high education (0.588 for urban and 0.846 for rural).

In each model, different slope coefficients are fit for different periods to reveal direction and rate of change in gender inequality within political periods. For instance, the slope coefficient of the 1949-1957 period is estimated to be -0.0121 (in the first column of the first panel), indicating that the rate of decline in gender inequality was 0.0121 LOR per year for the transition to elementary education in urban China between 1949 and 1957. Likewise, for the same transition, gender inequality increased at a rate of 0.0231 LOR per year during the Great Leap Forward period, decreased at a moderate rate of 0.0185 per year during the transition period, then decreased at a rapid rate of 0.0675 per year during the Cultural Revolution, and finally remained essentially flat during the economic reform years.

Taken as a whole, our results depict a general trend of declining gender inequality for the economic recovery period, with the exception of the insignificant effect of rural junior high school. During the Great Leap Forward, positive slope coefficients show that there were increases in gender inequality across the board. For the transition period between the Great Leap Forward and the Cultural Revolution, we do not find a clear trend; however, compared to the Great Leap Forward period, there was either a decline or an increase at a much slower rate in gender inequality. Most notably of all, declines in gender inequality during the Cultural Revolution were consistently large, between 0.0243 (for the transition to junior high education in urban areas) and 0.0675 (for the transition to elementary education in urban areas) LOR per year, and these figures generally far exceed rates of decline in any other periods (with the exception of junior high education in urban areas). Finally, the reform era exhibits a reversal (for the case of urban elementary education) or, compared to rates in the Cultural Revolution, a slowdown in the decline in gender stratification (for the other three cases).

The trends described by the slope coefficients reported in Table 2 can be clearly seen in Figures 3 and 4, which give observed and predicted levels of gender inequality between 1949 and 1985. The figures show similar trends between urban and rural residents but underscore the persistent residential gap in gender inequality. They illustrate vividly that periods delineated by different policy orientations affected gender disparity in attaining elementary and junior high education in markedly different ways.

Further Analysis for Hebei, Shaanxi, and Shanghai

To supplement these results obtained from the 1990 China Census tabular data, we analyze unit-record CIFS data for Hebei, Shaanxi, and Shanghai. Two logistic regressions are shown in Table 3: the first models the transition to elementary school, and the second models the transition from elementary school to junior high school.

In addition to all two-way interactions among province, sex, and residence, the two models also control for the yearly trend in educational attainment with a set of dummy variables. In general, the control variables show bonuses for men, urbanites, and residents of Shanghai. Of real interest are coefficients representing the interaction between sex and a flexible spline-function for political periods. These interaction parameters measure linear changes in the male to female log-odds-ratio of the transition within periods and are thus identical in interpretation to the coefficients of the spline-function slope variables reported in Table 2 for the national data.

Results from CIFS concerning trends in gender educational inequality generally agree with those found at the national level. Again, there are mixed results during the economic recovery period, with a positive coefficient for the transition to elementary school and a negative coefficient for the

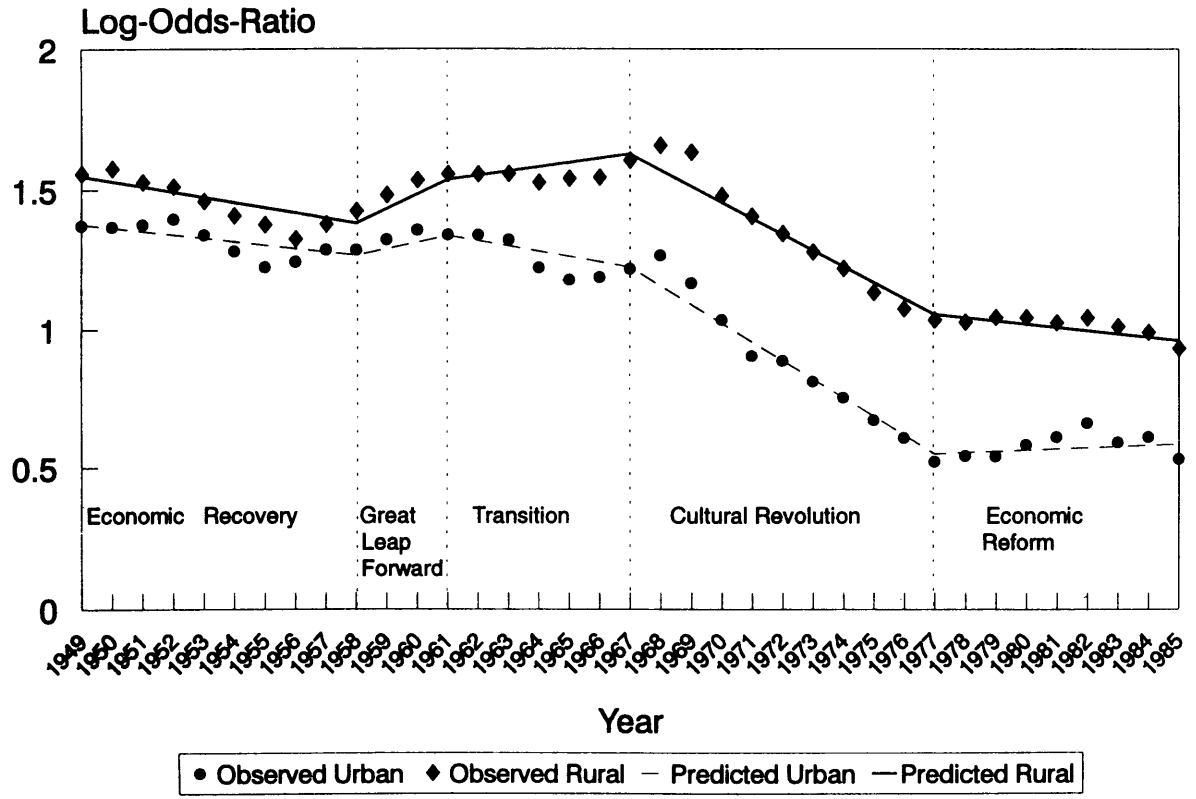

Figure 3. Observed and Predicted Gender Inequality in Transition to Elementary Education, Year by Residence

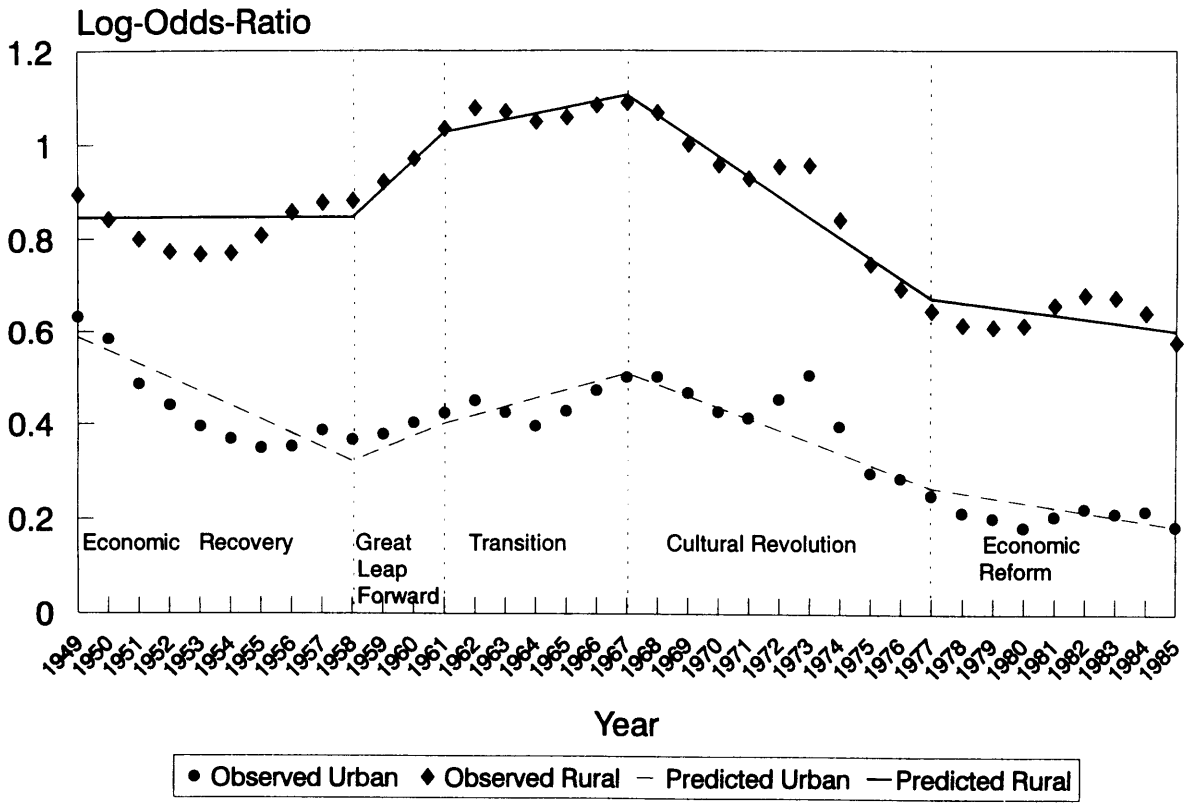

Figure 4. Observed and Predicted Gender Inequality in Transition to Junior High School Education, Year by Residence

Table 3. Spline-Smoothing Logistic Regressions of Gender Inequality in Transitions to Elementary and Junior High School Education for Hebei, Shaanxi, and Shanghai

	To Elementary School		*To Junior High School*	
Variables	*Coefficients*	*(S.E)*	*Coefficients*	*(S.E.)*
Yearly Trend from 1949-1985	[37 Dummy Variables]			
Sex (Excluded = Female)				
Male	1.783	(0.140)	1.202	(0.150)
Residence (Excluded = Rural)				
Urban	2.022	(0.210)	1.919	(0.112)
Province (Excluded = Hebei)				
Shaanxi	-0.128	(0.046)	-0.031	(0.052)
Shanghai	1.638	(0.082)	0.520	(0.058)
Sex*Residence				
Male and Urban	-1.126	(0.290)	-0.576	(0.104)
Sex*Province				
Male and Shaanxi	-0.040	(0.087)	0.127	(0.067)
Male and Shanghai	0.281	(0.209)	-0.281	(0.075)
Province*Residence				
Urban and Shaanxi	1.098	(0.329)	0.518	(0.150)
Urban and Shanghai	1.255	(0.342)	1.248	(0.120)
Sex*(Spline Function for Trend)				
Male and Slope in 1949-1957 (×10)	0.271	(0.222)	-0.428	(0.229)
Male and Slope in 1958-1960 (×10)	1.124	(0.619)	1.548	(0.517)
Male and Slope in 1961-1966 (×10)	-0.386	(0.487)	-0.459	(0.231)
Male and Slope in 1967-1976 (×10)	-1.221	(0.282)	-0.590	(0.134)
Male and Slope in 1977-1985 (×10)	-0.539	(0.264)	-0.359	(0.185)
Goodness-of-Fit Statistics				
Sample Size (n)		35,847		28,042
-2 Log-Likelihood		19,114.5		29,762.1
Model χ^2 (df = 50)		6,477.2		7,733.7
Sex*(Spline Function) χ^2 (df = 5)		226.4		169.1

Source: Micro data constructed from the 1985 China In-depth Fertility Survey in Hebei, Shaanxi, and Shanghai.

transition to junior high school, though neither is significantly different from zero by a z-test. The case of the Great Leap Forward, by contrast, is more consistent and interpretable: the interaction coefficient indicates a surge in gender inequality during the Great Leap Forward by 0.1124 per year for the transition to elementary education and by 0.1548 per year for the transition to junior high education (although the former is only marginally significant). The sex by slope interaction coefficients for the 1961-1966 transition period are negative but statistically insignificant. At both the elementary and junior high school levels, the coefficients for the Cultural Revolution show that this period's overall contribution towards gender equality was the largest and most significant of any period, at a rate of 0.1221 per year for the transition to

elementary education and 0.0590 per year for the transition to junior high education. By comparison, the sex by slope interaction coefficients for the reform era reveal that there was a slowdown after the Cultural Revolution in the trend towards equality at both the elementary and junior high school levels.

Goodness-of-fit statistics are presented in the bottom panel of Table 3. The model χ^2 statistic shows that all model parameters taken as a whole contribute to a significant improvement over the null (intercept only) model, for both regressions. The improvement in χ^2 attributable to the sex by spline function interaction alone indicates that these five interaction coefficients taken together contribute significantly to the goodness-of-fit of the models.

It should be noted that the sex by slope interaction parameters in the two models of Table 3 are not always consistent in terms of magnitude with substantively comparable slope coefficients in Table 2. This is not too surprising, as the models in Table 3 are based on individual-level data from three provinces, whereas the models in Table 2 are based on aggregate-level data for the whole nation. However, the agreement between the two sets of estimated parameters in terms of direction is very reassuring: the long-term trend in educational gender stratification has not been monotonic. For both data sets, the Great Leap Forward and the Cultural Revolution consistently demonstrate the greatest magnitude of deviation from average trends, with the Great Leap Forward enhancing and the Cultural Revolution detracting from gender inequality. In general, it is found that periods with a focus on equal opportunities, such as the economic recovery period and more clearly the Cultural Revolution, have been associated with declining gender stratification. Conversely, periods characterized by dominant economic concerns have been associated with either increases in gender inequality, as in the case of the Great Leap Forward, or at least with slowdowns in the secular trend of declining gender inequality, as in the case of the reform era.

The Role of Fertility Decline

The previous analysis demonstrated the plausibility of a strong relationship between political and educational emphases and educational gender inequality in the history of modern China. We realize, however, that our proposition is only tentative, and it is almost impossible to "prove" it to be true. The problem, of course, lies in the fact that we cannot rule out many other factors as possible causes for the observed trends reported in this paper. It is possible, for example, that changes in the parental choices about the education of male and female children were in part induced by rapid fertility declines, which in the case of China coincided with rapid decreases in educational gender inequality.

The fertility transition occurred rapidly in China during the 1970s. Fertility rates declined from a high regime of more than five to seven children per woman during most of the 1950s and 1960s to current levels just above replacement.

Marriage and birth control policies and laws have been stressed to varying degrees over time. Fertility policies were first implemented in the early 1960s, interrupted during the Great Famine, and reemphasized during the Cultural Revolution. Marriage laws were relaxed in the post-Cultural Revolution era, while the government implemented a stringent one child per family birth control policy in 1979.

Rural and urban fertility trends have proven similar, though a significant disparity in levels persists. From 1966 to 1979, for example, rural total fertility rates held steady at twice those of urban areas (Liu 1985, p. 6). We hypothesize that lower fertility enhances gender equity in educational attainment, as family resources are concentrated on fewer children under a low fertility regime. As an additional boon, lower fertility provides a decreased potential for son preference: parents simply cannot favor boys over girls with, for example, one child or two children of the same sex. It should be pointed out that economic incentives for having children are also related to political goals, especially in the countryside. Parents' incentives for bearing many children are reduced during periods of collective production, which make children's labor less valuable, while in times of economic crisis or in the recent period of privatization parents have a vested interest in bearing more children and in keeping them out of school for their labor value.[7]

Although we do not have necessary data to fully assess the impact of fertility declines, the CIFS data affords us a test of whether lower fertility is associated with less gender inequality in a cross-sectional setting. Since the fertility hypothesis in essence postulates that the preference for sons over daughters is reduced when parents have fewer children, the key issue is whether boys' advantage relative to girls in terms of accessing education is a decreasing function of the family size. For this purpose, we include an interaction between sex and sibship size in logistic regression models. If fertility decline explains the downward trend in educational gender inequality, we expect the following two predictions to hold true: (1) there should be an interaction effect between sex and sibship size so that gender inequality is greater among children from larger families than among children from smaller families; and (2) the interaction effect between sex and sibship size should "explain" the declining trend in educational gender inequality in recent years in the sense that the inclusion of the interaction term should make the sex by slope interactions (since 1967) nonnegative or significantly less negative. Due to data constraints, we examine only the transition to elementary school.[8] We control for yearly trends, sex, residence, province, and parental education, and include sex by slope interaction terms for the last two periods.

Table 4 shows coefficients and goodness-of-fit statistics for three nested models. Consistent with earlier research (e.g., Mare 1980), Model 3 shows a negative and statistically significant relationship between sibship size and attaining an elementary education, with an additional sibling reducing the log-

Table 4. Logistic Regressions of Gender Inequality in Transition to Elementary School Education for Hebei, Shaanxi, and Shanghai, 1976-1985

Variables	*Model 1* *Coefficients (S.E.)*		*Model 2* *Coefficients (S.E.)*		*Model 3* *Coefficients (S.E.)*	
Yearly Trend from 1967 - 1985			[19 Dummy Variables]			
Sex (Excluded = Female)						
Male	0.456	(0.222)	2.039	(0.519)	2.013	(0.442)
Residence (Excluded = Rural)						
Urban	0.577	(0.465)	0.571	(0.460)	0.571	(0.460)
Province (Excluded = Hebei)						
Shaanxi	0.057	(0.096)	0.048	(0.095)	0.048	(0.095)
Shanghai	1.934	(0.321)	1.986	(0.320)	1.983	(0.319)
Sibship Size	-0.223	(0.035)	-0.189	(0.036)	-0.191	(0.029)
Parental Education	0.248	(0.017)	0.249	(0.017)	0.249	(0.017)
Sex*Residence						
Male and Urban	-1.621	(0.518)	-1.674	(0.516)	-1.672	(0.515)
Sex*Province						
Male and Shaanxi	0.079	(0.156)	0.098	(0.157)	0.097	(0.156)
Male and Shanghai	-0.725	(0.434)	-0.837	(0.436)	-0.830	(0.430)
Province*Residence						
Urban and Shaanxi	1.227	(0.589)	1.254	(0.592)	1.253	(0.591)
Urban and Shanghai	0.988	(0.694)	1.015	(0.696)	1.015	(0.696)
Sex*(Sibship Size)						
Male*(Sibship Size)	0.082	(0.053)	-0.006	(0.058)		
Sex*(Spline Function for Trend)						
Male and Slope in 1967-1976 (×10)			-1.121	(0.519)	-1.119	(0.519)
Male and Slope in 1967-1985 (×10)			-0.567	(0.303)	-0.557	(0.285)
Goodness-of-Fit Statistics						
Sample Size (n)	16,623		16,623		16,623	
-2 Log-Likelihood	5,627.6		5,610.8		5,610.9	
Model χ^2 (df)	1,474.4 (30)		1,491.2 (32)		1,491.2 (31)	

Source: Micro data constructed from the 1985 China In-Depth Fertility Survey in Hebei, Shaanxi, and Shanghai.

odds of the transition to elementary school by 0.191.[9] By inference, therefore, the secular increase in educational attainment can in part be attributed to the parallel fertility decline. But this fact alone has no direct bearing on whether fertility decline was a cause for the rise in educational gender equity, as male and female children could benefit proportionally from their parents' low fertility. Thus, a test of the fertility hypothesis rests on whether the gender effect varies with sibship size, that is, whether there are interaction effects between sex and sibship size. Results reported in Table 4 do not lend support to the fertility hypothesis, as gender differences in attaining an elementary education are shown not to be significantly influenced by sibship size. Although the interaction between sex and sibship size is positive in Model 1 (indicating a greater gender gap for children from larger families), consistent with the first prediction discussed earlier, this interaction effect is statistically insignificant at conventional levels. Once the sex by slope interaction is included in Model 2, both the size and the statistical significance of the sex by sibship size interaction effect deteriorate further. The fit of Model 2 is significantly improved by the inclusion of the sex by slope interaction parameters, but there is no significant loss of fit when the sibship size by sex interaction is deleted in Model 3. This result indicates that the effect of sibship size does not depend on sex, or alternatively, that the gender inequality of attaining elementary education is unrelated to family sizes. We interpret this to mean that China's rapid fertility decline does not account for the declining trends in educational gender inequality since the Cultural Revolution. It is worth noting that the import of period effects on sex preference is confirmed in that (1) the sex by slope interaction parameters are a significant contribution to the model, and (2) the sex by slope interaction coefficients in Model 2 of Table 4 are almost identical in direction and magnitude to those found in the Model 3 of Table 4 and the first model of Table 3 using the full sample.

CONCLUSION

Several conclusions are in order. First, great gains have been made in gender equity at basic levels of education. Second, the rate of improvement has not been steady over time. Third, these gains do not appear to be simply a by-product of fertility decline, but rather a real improvement in women's status over time. Finally, from both the aggregate data at the national level and the individual data at the provincial level, we have consistently found strong positive effects of the Great Leap Forward, strong negative effects of the Cultural Revolution, and weak effects of the economic recovery and the reform era on gender inequality in transitions to both elementary and junior high schools. These results are consistent with our hypothesis that government emphasis on equality is likely to result in a decrease in gender inequality, and

government emphasis on economic development is likely to result in an increase or a slow decrease in gender inequality. These trends in inequality can be explained through direct consequences of educational policies of expansion or stagnation, as shown in Table 1, but also latently, through the differing social, economic, and demographic incentives influencing parental decisions to educate male and female children. In periods emphasizing equal opportunities, the government's social, economic, and educational policies encouraged similar education for male and female children, while the government's policies during periods with a strong emphasis on economic development provided incentives to favor male children over female children in the education system. For example, both economic hardship during the Great Famine and privatization during the economic reforms increased the opportunity cost of educating children, especially daughters, on whom long-term returns are tenuous, in terms of foregone labor. Conversely, collectivization during the economic recovery period and an egalitarian ethos during the Cultural Revolution reinforced the socialist ideal of equal treatment of males and females.

ACKNOWLEDGMENTS

This research was in part supported by a Young Investigator Award from the National Science Foundation and a Spencer Fellowship from the National Academy of Education to Yu Xie, and a pre-dissertation Fellowship from the Social Science Research Council to Emily Hannum. The authors are grateful to Robert Althauser, Martin Whyte, Yossi Shavit, and anonymous reviewers for advice and comments on earlier drafts of this paper. The opinions expressed herein are those of the authors. Direct all correspondence to Yu Xie, Population Studies Center, 1225 South University Avenue, University of Michigan, Ann Arbor, MI 48104-2590.

NOTES

1. With the decreasing trend serving as a baseline, we consider a halt in decreasing gender inequality to be an aberration from the secular trend of narrowing gender differentials in China.

2. There is no clear distinction in the 1990 China Census and the CIFS between the highest level of education ever attended and the highest level of education completed. For this study, the measured level of education refers to the highest level attended.

3. These sample sizes reflect further restrictions excluding cases that (1) contain missing values for variables used in the regression analysis or (2) would have experienced period effects before 1949 or after 1985 according to equation (1).

4. Lavely, Xiao, Li, and Freedman (1990) chose the middle age in each education level as the significant age. Due to data constraints explained in note 2, we view the critical age to be the typical age at start of each level of education. As is true with many measures in social science, this measure of year of transition (equation 1) is only an approximation. However, measurement errors that are bound to occur at the individual level do not pose any serious threat to our study

of the overall trends, because transition years measured according to equation (1) can be off by only 1 to 2 years in either direction for transitions to elementary and junior high school and such measurement errors are likely to cancel each other out in aggregation or regression. For transitions into higher levels of education, however, measurement errors associated with this procedure would be much greater.

5. Rapid increases in secondary attainment during the Cultural Revolution were in some part artifactual, due to reclassification of schools and debasement of curricula (Lavely et al. 1990, p. 72).

6. The generalized least squares method of estimation is equivalent to transforming the original variables in order to account for serial correlation of error terms, or autocorrelation. To estimate the coefficient of first-order autocorrelation (r), the Durbin-Watson statistic from an ordinary least squares regression of the dependent upon the independent variables is used to make an initial estimate r. We then use r to transform all variables in the equation, and obtain a new Durbin-Watson statistic from ordinary least squares regression using these transformed variables. The process is repeated until r cannot be further improved. When the transformation is successful, OLS estimation using the transformed model eliminates the consequences of serially correlated disturbance terms.

7. Notably, the recent introduction of responsibility systems, economically autonomous specialized households and units, and special economic zones in rural areas has resulted in greater withdrawal rates of pupils who have little to gain from staying in school beyond the first few years of primary education and a great potential for immediate financial contribution to the family (Lewin and Xu 1989, p. 10). Again, rural girls experience both the educational barriers of all rural children and the gender-specific hurdles sustained by rural family structures.

8. Because information about sibship size was only available for children of main respondents, there were not enough cases in the ages appropriate for testing hypotheses about junior high school. This constraint also restricts the time of elementary transition to the most recent two periods.

9. This estimate is comparable to Mare's (1980, p. 301) estimate of -0.13 for the effect of sibship size on the log-odds of completion of elementary school in the United States.

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