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# GENDER DIFFERENCES IN CHILDREN'S SCHOOLING DURING THE INDUSTRIALIZATION PERIOD: KOREA FROM 1965 TO 1994

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*This paper focuses on gender differences in schooling by school types and levels from 1965 to 1994, and examines four hypotheses explaining the trends. The findings show that all four factors examined — income levels, labor market returns, educational policy, and family changes — are relevant in explaining gendered patterns of schooling. Labor market returns, especially these returns right after graduation, are particularly important in influencing patterns of female schooling. For example, over the past few decades, rates of employment within one year of graduation were high for vocational high schools and junior colleges, and those were the schools where female enrollment fared well compared to male enrollment. Meanwhile, the main force determining male schooling appears to be high returns to college education, unaffected by yearly fluctuations in employment prospects or industrial structure.*

## INTRODUCTION

While development studies scholars consider rich human capital resources-including a highly educated labor force — one of the most important factors leading to Korea's rapid economic growth (Amsden, 1989), some researchers argue that, in the specific case of Korean women's education, schooling was not for employment purposes but for marriages. To these researchers, the dramatic expansion of higher education among Korean women during the past few decades is inexplicable otherwise, given the low level of labor force participation among educated Korean women as compared to women in other, similar economies (Kim, 1990; Brinton, Lee, and Parish, 1995; Choe, 1998).

Throughout the history of Korea, however, higher education was never a prerequisite for women's "good" marriages. Although sons' academic success brought prestige and prosperity to the extended family as well as to these children themselves (Sorensen, 1994), brides ideally received appro-

priate informal training to raise children and do housework properly, not formal education similar to that of men.

An alternative explanation, then, is that competition among women for better-qualified husbands has hastened the expansion of female higher education. However, such an argument appears to be circular in its logic. For example, an increase in college-level homogamy during the 1980s (Park, 1991) should be a consequence of an increase in women's college education (whichever factor triggered it), even though such a marriage pattern may have later caused further expansion of women's college education.

Another analysis of women's schooling posits that other factors affected gender imbalance in schooling in Korea, thus weakening the rationale to directly link low levels of women's labor force participation to motives for marriage-markets returns. For instance, there is the idea that gendered patterns of intergenerational exchange relations contributed to parents' decisions on unequal schooling between sons and daughters. Thus, changes in gender dynamics in marital and intergenerational relations affect the schooling of both genders of children. Income levels and educational policies are also important factors in determining children's schooling. Most of all, despite generally low levels of Korean women's labor force participation, these rates have increased substantially over the past few decades.

This paper examines trends in gender differences in schooling and explores factors that affect the trends. Parents are assumed to be the primary decision makers and children's schooling is assumed to be determined by cost-benefit analysis, which considers gender roles at work and in the family. The following section discusses four hypotheses related to the schooling of both genders of children and the gender gaps. Macro and micro-level data are used, and discussed followed by summary and conclusion.

## HYPOTHESES/EXPLANATIONS

### *Income Levels*

One hypothesis explaining gender differences in schooling is related to income levels. Studies in both cross-cultural and household comparisons show that gender gaps in schooling decrease as income rises. In a study of 36 developing countries, Alva et al. (1998) find that the overall level of school enrollment rises with development (measured by per capita GDP), and that gender differences in school enrollment rates decrease with development. Shavit and Blossfeld (1993) examine 13 countries in Europe and Asia and find that class boundaries tend to remain stable, but gender gaps

are likely to decrease during the process of educational expansion.

Similarly, schooling differences between sons and daughters are generally greater among lower-class than higher-class families. For example, in Taiwan, the gender gap in children's schooling decreased, but girls from lower social strata lag behind in this trend (Tsai, Gates, and Chiu, 1994). In Korea, the gender gap in schooling decreased faster among working- and lower-class families than among upper- or middle-class families, but the gender gap is still larger in the two lower classes than in the two higher ones (Kim, 1993:169).

Studies do not always discuss the mechanisms behind the negative relationship between income levels and gender differences in schooling. But an underlying logic says that virtually a universal preference for boys' over girls' schooling exists and that such a preference is more likely to be exercised when resources are limited. If resources are sufficient, gender preferences are no longer observed. Among poor families, girls' labor may be valued more than boys.' Or people in wealthier families or nations may have more egalitarian attitudes than their counterparts in poorer ones, because of differences in educational attainment.

At the cross-national level, the mechanisms relating income level and gender patterns of schooling may be more complex, involving the conditions of labor markets as well as of the family and educational institutions. Economic development requires a more skilled labor force in the industrial and service sectors, and such demands may improve women's employment prospects and thus increase women's schooling. With rising incomes, various changes in family and educational systems may also affect gender schooling gaps.

While evidence exists that the gender gap in schooling decreases with rising incomes, previous studies do not provide explanations for the mechanisms linking the two. Also, the income hypothesis is based on indicators of the overall measure of schooling, such as years of schooling, and does not provide predictions on the gender gap for different levels or types of schools. For example, the gender gap may decline over time at lower levels of education, but may increase at higher levels, as the Taiwan data suggests (Tsai, Gates, and Chiu, 1994). The income hypothesis is thus too general to make such distinctions.

### *Labor Market Returns*

While the income hypothesis emphasizes the relative costs of educational financing, other hypotheses focus on the returns of education in explaining

gender differences in schooling. The premise is that education's relatively good income returns encourage parents to invest more in children's education as opposed to other forms of investment. The two markets where parents consider the returns of children's education are marriage and work. Some argue that parents also consider the share of these returns given to them in times of need, which is determined by family dynamics (Greenhalgh, 1985; Lee, Parish, and Willis, 1994). This section discusses labor market returns as the determinant of children's schooling, and a later section discusses circumstances related to marriage and the family.

The literature on the labor market returns of education focuses on wage premiums, presented either as percentage gains per additional year of schooling, or as wage ratios of higher to lower school levels. In addition to these ratios for each gender, the wage gaps between the genders also affect parents' decisions on their sons and daughters' schooling. In Korea, however, the rates of women's labor force participation increased substantially for the past three decades, from 36 percent in 1965 to 48 percent in 1995. The change during that period is particularly large for urban women, from 24 to 46 percent (Noh et al., 1992; KWDI, 1986, 1996). Thus, a more important factor affecting girls' schooling in Korea than the wage premiums of education may be employment opportunities.

The increase in women's labor force participation was also noticeable among college-educated women, both unmarried and married. Among unmarried women with a four-year college education, the rates of employment increased from 50 percent in 1970 to 70 percent by the mid-1990s. Among married women with the same education, the rates increased from 20 to over 30 percent during the same period (KWDI, 1986, 1992; KEDI various years). These increases in college-educated women's labor force participation may have encouraged parents to send their daughters to college. Despite this generally increasing trend, employment rates within one year after graduation fluctuated considerably during the past few decades. This is because such short-term employment is affected not only by overall labor demand, but is also contingent on the number of graduates number of graduates that reflects the consequences of educational policies.

Industrial or occupational restructuring contributes to changes in schooling patterns, as the economy comes to demand different characteristics of the labor force. The effects of labor market shifts on school enrollment are especially important when enrollment expands rapidly (Walters, 1984, 1986). Since the first five-year plan of economic development was launched in 1962, the Korean economy experienced massive transformation. Through the 1970s, the relative size of the labor force in the secondary sector

increased rapidly, from 10 percent of the total labor force in 1965 to 24 percent in 1979. The percentages continued to increase during the 1980s, although the pace slowed, but during the early 1990s, the percentage decreased by five percentage points and reached 24 percent again in 1994. The relative size of the tertiary-sector labor force was three times that of the secondary sector at the onset of industrialization, or 30 percent, in 1965. However, the percentage of the tertiary-sector labor force remained stable until the mid-1970s, and then started a sharp, straight increase, reaching 63 percent in 1994 (KNSO various years). The expanding industrial sector in the 1970s may have increased overall schooling without affecting higher education. Floor workers in factories were usually primary- or middle-school educated, and a majority of male workers in technical occupations received a vocational high school education. As the tertiary sector expanded to include high-quality service jobs since the 1980s, demand for labor force with higher education increased (Lee, 1984, 1991).

These shifts in GDP distributions across these sectors also mean changes in the composition of the labor force. These labor force trends resemble the distribution of the GDP, except that the percentages of the GDP from the secondary and tertiary sectors are higher than the percentages of the corresponding labor force. For example, in 1990, the distribution of the GDP was 8.7, 29.7, and 61.6 percent, but the comparative composition of the labor force was 17.9, 27.6, and 54.5 percent in the primary, secondary, and tertiary sectors, respectively (BOK various years). This discrepancy indicates higher productivity in the secondary and tertiary sectors than in the primary sector. With the expansion of the secondary and tertiary sectors, the percentage of paid employees in the labor force also increased dramatically. The percentage of male paid employees was 38 in 1965, but this increased to 64 in 1994. The analogous percentages for female workers increased even faster, from 21 to 59 (KNSO various years).

Wage premiums to education among men decreased steadily in Korea since the 1970s. In the early 1970s, the wages of college-educated male workers were more than double that of their counterparts with middle-school or less education, but by the 1990s, the ratio decreased to only about one and a half. Corresponding wage ratios among female workers were more stable, at about three (KMOL various years). Thus, by the late 1980s, the premiums for college education were higher among women than among men. This suggests that the relative wage status of the "less educated" has improved among men and also that the gender wage gap has decreased among college graduates. These wage trends may have been translated into a slower increase in college advancement among men compared to women.

*Educational Policy*

Government policies have been a key determinant of educational outcomes in Korea (Lee and Brinton, 1991). Two important policies related to schooling outcomes are over entrance quotas and public educational expenditures. Although these policies are not gender- specific, they have different consequences for the schooling of boys and girls.

Each year, the Korean Ministry of Education approves entrance quotas for individual schools, including four-year universities and colleges, junior colleges, and high schools. These quotas set the maximum number of students to be enrolled in each school. Our preliminary analysis shows that the numbers of new students concur with these entrance quotas over the years, suggesting a greater demand for college education than realized. During the 1980s, the government expanded entrance quotas for colleges dramatically, and number of entrants increased accordingly. Researchers observe that in Korea, labor force forecasts are not a major force in determining entrance quotas. The Korean government has been receptive to popular demand for children's higher education (Cheng, 1993; Kim, 1993).

During the past three decades, public expenditures on education per pupil increased dramatically at the primary and secondary levels of education — from 73 to 959 U.S. dollars and from 100 to 770 U.S . dollars, respectively, between 1965 and 1990 (Ahlburg and Jensen, 1997). At the tertiary level, however, these expenditures reached their highest level in the 1970s and then decreased during the 1980s, amounting to 428, 795, and 450 dollars in 1965, 1970, and 1990, respectively. Compared to other Asian countries, a relatively large share of public expenditures on education was allocated to primary and secondary education, and higher education comprised only a small share of public expenditures — i.e., in 1990, 44.3, 34.1, and 7.4 percent, respectively. In Taiwan, for example, the analogous percentages were 23.7, 31.4, and 23.8 percent (Tan and Mingat, 1992; Ahlburg and Jensen, 1997). Given Korea's high rates of enrollment in tertiary education, the data suggest that the financing of higher education is largely from private sources. With educational loans not readily available in the financial market, parents are the major source of college education financing (Yoon, 1995).

An increase in public expenditures on education per pupil implies lower educational costs for parents, and may promote daughters' education. For example, in Hong Kong, an expansion of public sponsorship for children's schooling during the 1970s erased the gender gap in schooling and, by the 1980s, girls were even more likely than boys to enroll in schools (Pong and

Post, 1991; Post, 1994). However, when an increase in public expenditures accompanies an expansion of entrance quotas, greater public expenditures are spread among the larger numbers of students. In fact, during the 1980s while the entrance quotas expanded in Korea, per-pupil expenditures on higher education decreased, whereas the overall size of public expenditures, compared with the GDP, peaked. This decrease in per-pupil public expenditures for higher education may have widened the gender gap in enrollment.

*Family-Related Explanations*

Changes in family relations may also affect parental decisions on daughters' schooling. Cultural norms governing marriage in most East Asian societies consider it desirable that a wife be no more educated than her husband. In patriarchal family systems, husbands have greater decision-making power than wives do, and such a power balance would be incompatible with wives who are more educated than their husbands (Kwon, 1985). This patriarchal marriage pattern, however, does not necessarily discourage women's education. Rather, there has been a steady gap between spouses' education. The gendered pattern has remained stable even while educational attainment increased rapidly (Park, 1991). Interestingly, among college-educated couples, husbands tend to have graduated from more prestigious colleges / universities than their wives (Lee, 1997).

Researchers speculate that marriage market returns (i.e., to find a more educated husband) may be an important reason for the expansion of female schooling (Kim, 1990; Brinton, Lee, and Parish, 1995). Indeed, in a 1993 survey, the percentage of parents who reported marriage as the main reason for their daughters' education was higher than the percentage that reported employment as the main reason. This was true regardless of the parents' educational levels. However, for high-school- or more educated parents, the percentage that reported personal growth as the main reason was higher than the percentage of those reporting the two pragmatic purposes combined. For middle-school- or less educated parents, the pragmatic reasons of marriage and employment combined was more important than personal growth (KNSO, 1993). Despite these differences, a majority of all educational groups of parents expected to send their daughters to college: 62 percent of household heads with middle-school or lower education and 95 percent of household heads with high-school or more education (KEDI, 1996).

Rewards to having highly educated husbands may include things other than monetary returns, such as social prestige or respect. Monetary returns can be approximated by the wage premiums of educated men. Thus, the

hypothesis of marriage-market return motivation predicts that female schooling will be positively related to the wage premiums of educated men. So long as unequal gender relations remain the norm, however, marriage market returns alone will not change gender gaps in schooling drastically.

Another aspect of the returns of education is intergenerational relations. Studies exploring gender and generation hierarchies in East Asian families argue that parents invest relatively small amounts of resources in their older daughters' schooling and channel their returns into younger sons' higher education (Greenhalgh, 1985; Parish and Willis, 1993; Salaff, 1981). Parents do this because sons are responsible for supporting parents in their old age, while daughters leave home upon marriage to join their husbands' families. In fact, the income hypothesis is also based on this gender preference. A transformation of patrilineal family systems into more egalitarian ones will contribute to the reduction of the gender gap in schooling.

Fertility decline is another aspect of family changes that affect intergenerational gender dynamics. Economists discuss trade-offs between the quantity and quality of children, i.e., between the number of children and their educational attainment (Ahlburg and Jensen, 1997; Behrman and Taubman, 1995). Reduced fertility means extra household resources per child, and it also means that more girls have no brothers to compete with for family resources. Another important consequence is the increased importance of daughters to parents as a source of help in times of old age or illness, contributing to changes from patrilineal family practices to bilateral ones.

As we discuss in the next section, trends in family changes (such as fertility decline and reduction in extended family living) are highly correlated with economic change, and both indicators are almost linear functions of time, reflecting rapid national economic growth. Also, it is hard to capture marriage market returns in a few summary indicators. With these limitations, this study examines how relevant the above four explanations are to male and female schooling and the gaps between them.

## DATA AND METHODS

The analysis focuses on the levels and determinants of annual entrance (or enrollment) rates over the past three decades. We examine these rates by school levels and types, and separately for male and female youths. The multivariate analyses use the time-series regression model, which controls for auto-correlation between errors of consecutive years (Greene, 1995).

Entrance rates are measured by ratios of the number of students who entered a certain type and level of schools, including re-examiners, to the

number of graduates from lower-level schools in the year. Enrollment rates are ratios of the number of students currently enrolled in schools, to the total number of youths in the relevant age groups, i.e., ages 15-17 for high school, and ages 18-21 for college and university enrollment rates. Throughout the study, these ratios are multiplied by 100 and presented in percentages.

The explanatory variables include GNP per capita, percentages of urban and rural household expenditures spent on education, percentages of the GDP used in public expenditures on education, percentages of the GDP produced in the secondary and tertiary sectors, educational wage premiums, and employment rates within one year of graduation. Variables considered but excluded from the analysis because of high correlation with other variables include fertility rates, percentages of the labor force by industrial sectors, percentages of the labor force by occupational sectors, women's labor force participation rates, and percentages of extended family households. Social change has been rapid in Korea, and many indicators show the pattern of monotonic changes with little fluctuation, resulting in high correlation coefficients with one another. The shortage of data exacerbated this collinearity problem, as we used interpolation methods to estimate yearly data from periodic data such as the quinquennial census. In principle, our analyses include only those indicators whose yearly data were available and which showed weak correlation coefficients with others.

Percentages of GDP from the secondary and tertiary sectors represent both the sizes of the relevant labor force and the productivity in these sectors. These percentages, especially in the tertiary sectors, also represent rising incomes, with a high correlation with per capita GNP (correlations were .65 and .87, respectively). Percentages of urban and rural household expenditures spent on education measure the size of private expenditures on education. The percentage of the GDP spent on education measures the size of public expenditures on education, and it reflects public expenditures per student as well as the number of students enrolled in schools. The percentage of the GDP spent on education shows a stable trend, with a small mound during the 1980s, when college-entrance quotas expanded dramatically.

Data for the macro analysis are from such sources as *Social Indicators in Korea, Educational Indicators in Korea, Statistical Yearbook of Education, Reports of Occupational Wage Surveys, Reports of Population and Housing Censuses, Economic Statistics Yearbook,* and *Statistical Yearbook on Women.*

This study also performs supplementary analysis of micro-level data to examine hypotheses on family changes. We use data from the *Survey of*

*Family Structure and Support Systems in Rural Areas*, which contain information on schooling of all children from 590 families (see Kim et al., 1993). The sample is representative of rural households in Korea that include at least one person aged 60 or older.

## FINDINGS

### *Trends in Schooling by Gender*

Before testing the hypotheses, this section describes the trends in schooling. Gender differences in the mean years of schooling completed by the adult population have steadily decreased. Among people aged 40-49, men received 3.1 years more schooling than women in 1970, but the gap was 1.8 years in 1995.[1] However, this decrease in the gender gap in the mean years of schooling completed does not necessarily mean that the gender gap in enrollment rates decreased at all school levels. The gender gap in high-

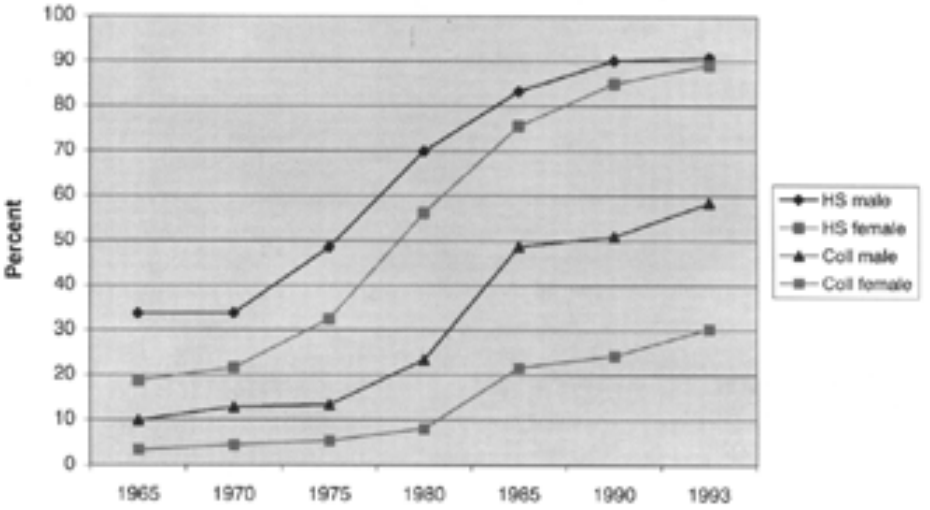


**FIGURE 1.**

[1]Trends in mean years of schooling.

| | | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 |
|---|---|---|---|---|---|---|---|
| Age 20-29 | Male | 8.8 | 9.3 | 10.3 | 11.3 | 12.3 | 12.7 |
| | Female | 7.5 | 8.4 | 9.4 | 10.6 | 11.8 | 12.7 |
| Age 40-49 | Male | 6.4 | 7.9 | 9.0 | 9.9 | 10.6 | 11.3 |
| | Female | 3.4 | 4.8 | 6.0 | 7.1 | 8.4 | 9.5 |

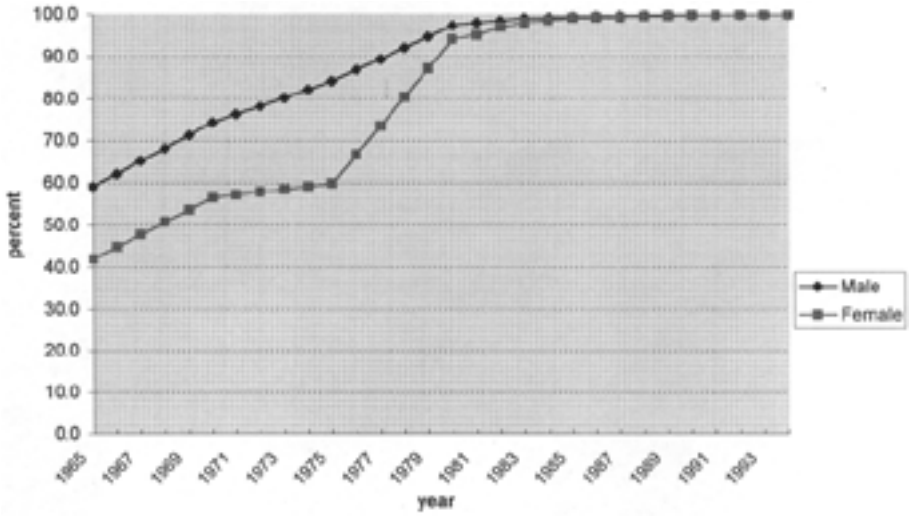


**FIGURE 2.** ADVANCEMENT RATES FROM ELEMENTARY TO MIDDLE SCHOOL

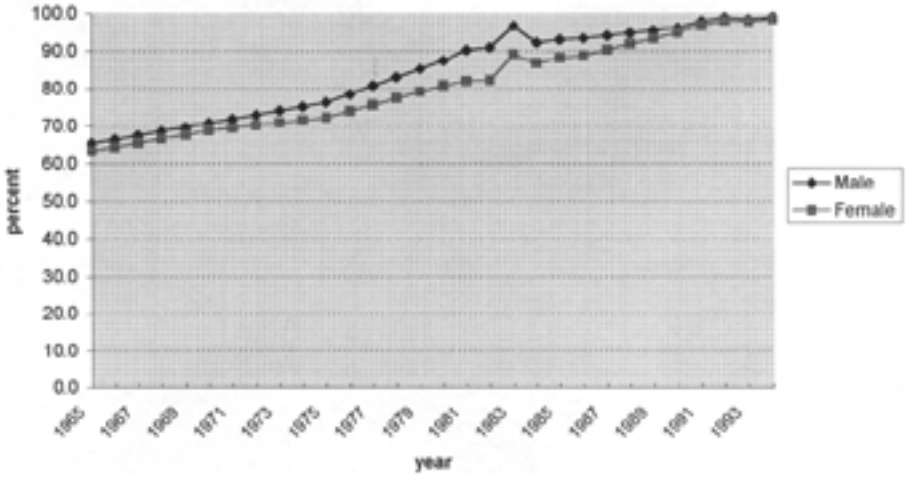


**FIGURE 3.** ADVANCEMENT RATES FROM MIDDLE TO HIGH SCHOOL

school enrollment rates steadily decreased, but gender differences in college enrollment rates increased during the late 1970s and the early 1980s (Figure 1). Gender patterns are even more diverse in advancement rates to higher-level schools among graduates from lower-level schools. Advancement from primary schools to middle schools was much less frequent among girls than among boys until the late 1970s (Figure 2). If girls attended middle

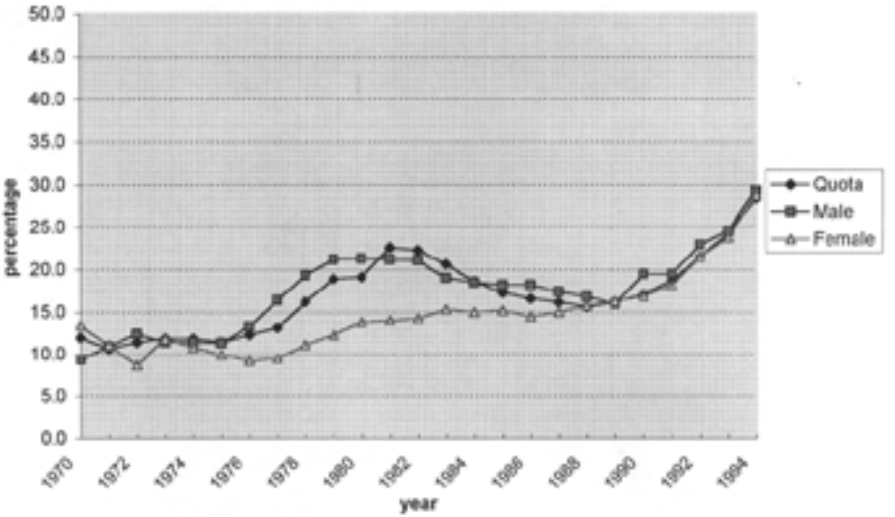


**FIGURE 4.** ADVANCEMENT RATES FROM HIGH SCHOOL TO JUNIOR COLLEGE

| | Quota | Male | Female | Quota | Male | Female |
|---|---|---|---|---|---|---|
| 1970 | 12.0 | 9.4 | 13.4 | 26.5 | 28.6 | 18.7 |
| 1971 | 10.6 | 10.9 | 11.1 | 23.1 | 27.4 | 18.2 |
| 1972 | 11.4 | 12.4 | 8.7 | 23.2 | 26.2 | 17.8 |
| 1973 | 11.9 | 11.4 | 11.8 | 22.3 | 25.0 | 17.1 |
| 1974 | 11.8 | 11.4 | 10.8 | 21.6 | 24.0 | 16.5 |
| 1975 | 11.4 | 11.3 | 9.9 | 21.1 | 23.1 | 15.7 |
| 1976 | 12.3 | 13.3 | 9.2 | 18.9 | 21.1 | 13.8 |
| 1977 | 13.1 | 16.4 | 9.5 | 17.0 | 19.6 | 11.4 |
| 1978 | 16.2 | 19.3 | 11.1 | 17.9 | 21.4 | 12.2 |
| 1979 | 18.9 | 21.2 | 12.3 | 22.9 | 28.6 | 13.9 |
| 1980 | 19.1 | 21.3 | 13.8 | 25.3 | 31.9 | 15.3 |
| 1981 | 22.6 | 21.2 | 14.0 | 39.4 | 43.3 | 21.4 |
| 1982 | 22.3 | 21.1 | 14.2 | 37.9 | 45.3 | 25.5 |
| 1983 | 20.7 | 19.0 | 15.3 | 36.5 | 42.0 | 28.5 |
| 1984 | 18.6 | 18.5 | 15.0 | 35.0 | 41.1 | 26.4 |
| 1985 | 17.3 | 18.2 | 15.2 | 33.0 | 39.8 | 24.1 |
| 1986 | 16.6 | 18.2 | 14.5 | 31.4 | 39.0 | 22.2 |
| 1987 | 16.2 | 17.4 | 15.0 | 30.7 | 36.1 | 22.5 |
| 1988 | 15.6 | 16.8 | 15.8 | 28.5 | 33.3 | 22.8 |
| 1989 | 16.2 | 16.0 | 16.3 | 28.4 | 30.4 | 23.1 |
| 1990 | 17.1 | 19.5 | 16.9 | 26.7 | 30.3 | 22.6 |
| 1991 | 18.7 | 19.5 | 18.2 | 27.7 | 32.2 | 24.0 |
| 1992 | 21.5 | 22.9 | 21.5 | 29.4 | 34.1 | 25.4 |
| 1993 | 24.2 | 24.6 | 23.8 | 31.5 | 36.0 | 26.8 |
| 1994 | 28.4 | 29.3 | 28.7 | 35.6 | 41.1 | 29.5 |

Table 2 for PAA-2, Returns to Education

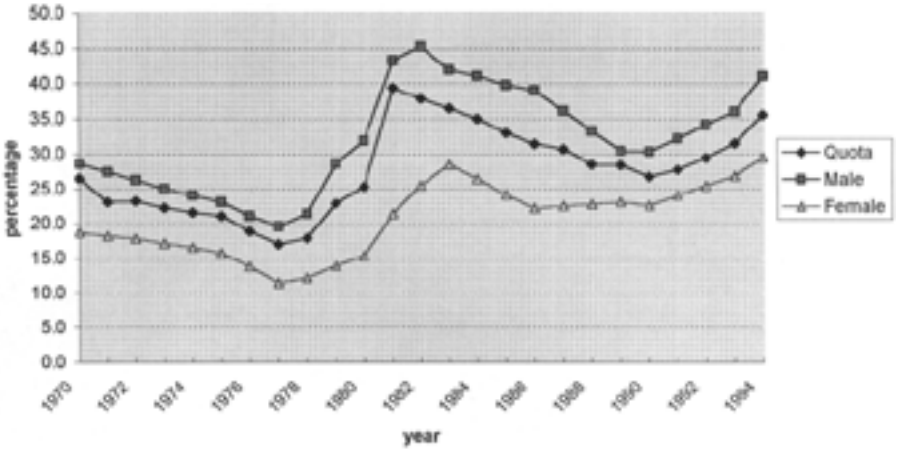


**FIGURE 5.** ADVANCEMENT RATES FROM HIGH SCHOOL TO 4-YEAR COLLEGES AND UNIVERSITIES

schools, however, their advancement to high schools was almost as likely as that of boys. The gender gap in high school advancement widened slightly during the mid-1980s, but throughout the 30-year period, the gaps were within 10 percentage points (Figure 3).

Advancement rates from high schools to junior and four-year colleges / universities do not show monotonic trends over time (Figures 4 and 5). This is due to changing entrance-quota policies during the 1980s. Between 1981 and 1987, the government adopted a graduation quota system, designed to weed out poorly performing students throughout the college years. The system also allowed a dramatic expansion of entrance quotas. When the entrance quotas first expanded in the early 1980s, more boys took advantage of these increased quotas than girls, increasing the gender gap in college advancement rates. This increased gender imbalance was more evident for four-year colleges / universities than for junior colleges. In the late 1980s, after the graduation quota system was discarded and college entrance quotas decreased again, the gender gap in college advancement also decreased. During the 1990s, gender differences remained stable (Figure 5). Trends in college enrollment rates, however, are not entirely consistent with trends in college advancement rates (Figures 2, 5, and 6). Larger gender gaps in enrollment rates than in advancement rates during the 1990s suggest that male students are less likely to drop out or take longer to graduate than female students.

In summary, during the period of rapid industrialization, the gender gap

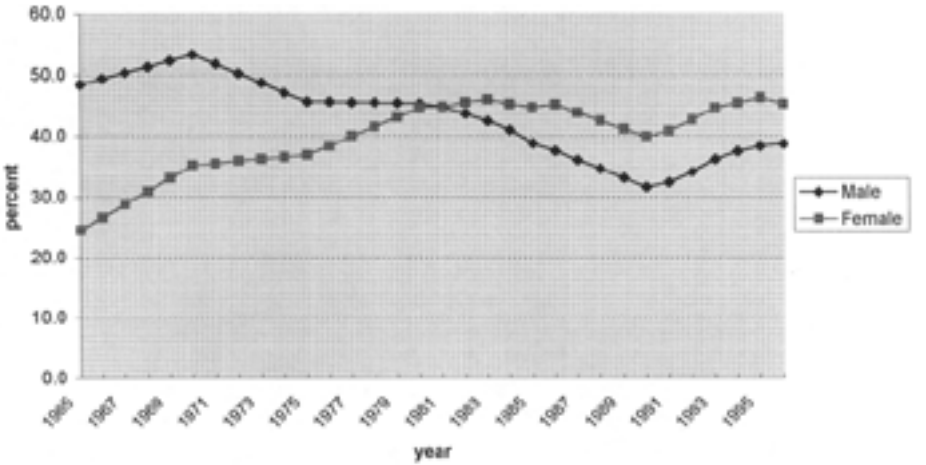


**FIGURE 6.** PERCENTAGE OF HIGH SCHOOL STUDENTS IN VOCATIONAL SCHOOLS

in the mean years of schooling decreased mostly due to narrowing the gender gap in primary and secondary education. In college advancement and enrollment, female youths continued to lag behind their male counterparts.

The next four sections discuss results from the regression analyses, which tests the hypotheses. The tables show different levels and types of schools, but the explanatory variables are almost the same. Table 1 presents advancement from primary to middle and middle to high schools, and Table 2 shows advancement from high school to colleges. Table 3 shows high school enrollment rates and the percentage of high school students who are in vocational schools.

*Income Hypothesis*

As is well known, Korea's GNP per capita increased substantially and continuously during the past few decades. Thus, the parallel growth in the GNP and in the mean years of schooling seems to confirm the income hypothesis that the gender gap in schooling decreases with the growth of income. However, in time-series regression analysis, none of the bivariate relationships between per capita GNP and gender gaps in school advancement rates is significant (Tables 1 and 2). For advancement from primary to middle schools and to high schools, per capita GNP shows some negative associations with gender gaps, but these associations' magnitudes are not large enough to be significant (Table 1). Combining these two levels of advancements, per capita GNP shows a significant negative relationship with the gender gap in high school enrollment (Table 3). Also important is

**TABLE 1.** DETERMINANTS OF ADVANCEMENT RATES TO MIDDLE AND HIGH SCHOOLS

| | Elementary to middle school | | | Middle to high school | | |
|---|---|---|---|---|---|---|
| | Male | Female | Gap | Male | Female | Gap |
| Constant | 69.7 | 55.6 | 15.2 | 68.8 | 63.5 | 4.9 |
| | (14.8) | (19.3) | (7.2) | (7.6) | (4.6) | (2.7) |
| Per capita GNP[a] | 3.6* | 5.8* | -2.3 | 5.0** | 6.5** | -1.0 |
| | (1.7) | (2.8) | (1.5) | (1.5) | (1.1) | (0.6) |
| Rho | 1.0** | 1.0** | 1.0** | 1.0** | 0.9** | 0.9** |
| | (0.0) | (0.0) | (0.1) | (0.0) | (0.1) | (0.0) |
| $R^2$ | 0.61 | 0.68 | 0.64 | 0.80 | 0.92 | 0.04 |
| Constant | 25.1 | -17.2 | 39.6 | 6.7 | 25.1 | -1.1 |
| | (13.1) | (17.8) | (11.4) | (5.6) | (12.2) | (5.8) |
| Percentage of urban household expenditure on education | -0.4 | -1.5* | 1.1* | -0.9 | -0.3 | -0.3 |
| | (0.4) | (0.7) | (0.5) | (0.5) | (0.5) | (0.2) |
| Percentage of rural household expenditure on education | 1.1* | 3.2** | -2.0** | 1.2* | 0.8 | 0.1 |
| | (0.5) | (0.8) | (0.6) | (0.6) | (0.6) | (0.3) |
| Ratio of public expenditure on education to GDP (times 100) | 0.8 | 2.6 | -1.8 | 0.7 | -0.5 | 1.1 |
| | (1.1) | (1.8) | (1.2) | (1.4) | (1.3) | (0.6) |
| Percentage of GDP from secondary sectors[b] | 0.6** | 0.8* | -0.2 | 0.8** | 0.5* | 0.0 |
| | (0.2) | (0.3) | (0.2) | (0.2) | (0.2) | (0.1) |
| Percentage of GDP from tertiary sectors[b] | 0.7** | 0.9** | -0.2 | 0.9** | 0.8** | 0.0 |
| | (0.2) | (0.2) | (0.2) | (0.1) | (0.2) | (0.1) |
| Rho | 0.9** | 0.9** | 0.9** | 0.6* | 0.9** | 0.9** |
| | (0.0) | (0.1) | (0.1) | (0.2) | (0.1) | (0.1) |
| $R^2$ | 0.90 | 0.97 | 0.92 | 0.97 | 0.96 | 0.40 |
| Mean of the dependent variable | 89.4 | 80.4 | 9.0 | 84.9 | 81.2 | 3.7 |
| n (1965-1994) | 30 | 30 | 30 | 30 | 30 | 30 |

* $p < .05$, ** $p < .01$

Numbers in the parentheses are standard errors.

a) The unit is 1,000 Won in the 1990 constant price.

b) The analysis uses values lagged by one year.

Data source: Various annual reports

the fact that per capita GNP shows a negative relationship with the gender gap in the percentage of high school students in vocational schools. In advancement to colleges, the GNP has no effect on the gender gap. Overall, the data seems to provide weak support for the income hypothesis.

These bivariate results, however, do not provide a convincing test of the income hypothesis. As discussed earlier, the GNP trend is highly correlated with many other socioeconomic trends in Korea. Other than income level per se, there are many possible mechanisms that connect these GNP and schooling trends, such as changes in labor markets, in attitudes and values,

**TABLE 2.** DETERMINANTS OF ADVANCEMENT RATES TO HIGHER-EDUCATION INSTITUTIONS

| | High school to college / university | | | High school to junior college | | |
|---|---|---|---|---|---|---|
| | Male | Female | Gap | Male | Female | Gap |
| Constant | 27.7 | 14.9 | 12.2 | 7.2 | 5.9 | 1.6 |
| | (7.5) | (4.1) | (4.4) | (4.0) | (2.5) | (3.7) |
| Per capita GNP[a] | 1.9 | 2.4 | -0.3 | 3.9** | 3.7** | -0.0 |
| | (2.1) | (1.2) | (1.3) | (1.1) | (0.8) | (1.1) |
| Rho | 0.9** | 0.8 | 0.8** | 0.9** | 0.8** | 0.8** |
| | (0.1) | (0.1) | (0.1) | (0.1) | (0.1) | (0.1) |
| $R^2$ | 0.15 | 0.45 | 0.00 | 0.52 | 0.79 | 0.00 |
| Constant | -35.4 | -20.1 | -16.5 | -24.2 | -36.5 | 11.6 |
| | (16.8) | (11.1) | (10.9) | (.13.4) | (5.3) | (8.0) |
| Percentage of urban household expenditure on education | -0.7 | -0.2 | -0.7 | -0.1 | 0.3 | -0.9 |
| | (1.0) | (0.7) | (0.7) | (0.7) | (0.5) | (0.6) |
| Percentage of rural household expenditure on education | 0.7 | 0.2 | 0.6 | -0.1 | -0.4 | -0.6 |
| | (1.0) | (0.7) | (0.7) | (0.7) | (0.6) | (0.6) |
| Ratio of public expenditure on education to GDP (times 100) | 5.3 | * | 1.5 | 4.3 | ** | 2.5 |
| | (2.3) | (1.5) | (1.8) | (1.6) | (1.5) | (1.6) |
| Percentage of GDP from secondary sectors[b] | -0.1 | -0.1 | -0.1 | 0.2 | 0.1 | 0.2 |
| | (0.3) | (0.2) | (0.2) | (0.2) | (0.2) | (0.2) |
| Percentage of GDP from tertiary sectors[b] | 0.7 | ** | 0.7 | ** | 0.0 | 0.5 |
| | (0.3) | (0.2) | (0.2) | (0.2) | (0.2) | (0.2) |
| Earnings ratio of male college to high school graduatesb | 5.4 | -1.6 | 8.2** | —- | —- | —- |
| | (3.3) | (2.2) | (2.6) | | | |
| Rho | 0.7** | 0.7** | 0.6** | 0.8** | 0.2 | 0.5** |
| | (0.1) | (0.1) | (0.2) | (0.1) | (0.2) | (0.2) |
| $R^2$ | 0.81 | 0.80 | 0.76 | 0.73 | 0.87 | 0.61 |
| n (1970-1994) | 25 | 25 | 25 | 25 | 25 | 25 |

* $p < .05$, ** $p < .01$

Numbers in the parentheses are standard errors.

a) The unit is 1,000 Won in the 1990 constant price.

b) The analysis uses values lagged by one year.

Data source: Various annual reports

and in family systems. The explanatory power of the income hypothesis is limited also by diverse patterns of schooling trends, according to the levels and types of schools.

*Labor-Market Return Explanations*

The proportions of the GDP produced in the secondary and tertiary sectors, which represent demand for skilled labor in these sectors, have posi-

**TABLE 3.** DETERMINANTS OF ENROLLMENT RATES FOR HIGH SCHOOLS AND PERCENTAGES IN VOCATIONAL HIGH SCHOOLS

| | All high schools: Academic and vocational HS | | | Percentage of students in vocational HS | | |
|---|---|---|---|---|---|---|
| | Male | Female | Gap | Male | Female | Gap |
| Constant | 41.6 | 25.6 | 17.6 | 49.0 | 30.6 | 17.8 |
| | (16.8) | (17.1) | (1.9) | (4.2) | (6.5) | (9.7) |
| Per capita GNP[a] | 6.9** | 9.5** | -3.0** | -2.2* | 1.9 | -3.5** |
| | (2.4) | (2.4) | (0.6) | (1.0) | (1.1) | (1.1) |
| Rho | 1.0** | 1.0** | 0.8** | 1.0** | 1.0** | 1.0** |
| | (0.0) | (0.0) | (0.1) | (0.1) | (0.0) | (0.0) |
| $R^2$ | 0.78 | 0.85 | 0.82 | 0.84 | 0.42 | 0.77 |
| Constant | -11.4 | -34.9 | 30.9 | 53.5 | 4.9 | 45.9** |
| | (22.9) | (24.6) | (9.8) | (10.2) | (7.5) | (10.4) |
| Percentage of urban household expenditure on education | -0.8 | -0.8 | 0.1 | -0.3 | -0.4 | 0.1 |
| | (0.8) | (0.8) | (0.4) | (0.4) | (0.3) | (0.3) |
| Percentage of rural household expenditure on education | 1.7 | 2.3* | -0.6 | -0.1 | 0.8* | -0.8 |
| | (0.9) | (0.9) | (0.5) | (0.4) | (0.4) | (0.4) |
| Ratio of public expenditure on education to GDP (times 100) | 1.4 | 1.3 | 0.1 | 1.5 | 1.6* | -0.1 |
| | (1.9) | (1.9) | (1.1) | (0.9) | (0.8) | (0.8) |
| Percentage of GDP from secondary sectors[b] | 0.8* | 0.8* | -0.1 | -0.4* | 0.1 | -0.5** |
| | (0.4) | (0.4) | -0.1 | (0.2) | (0.1) | (0.2) |
| Percentage of GDP from tertiary sectors[b] | 0.8** | 1.0** | -0.3 | -0.1 | 0.4** | -0.4** |
| | (0.3) | (0.3) | (0.2) | (0.1) | (0.1) | (0.1) |
| Rho | 1.0** | 1.0** | 0.9** | 1.0** | 0.9** | 1.0** |
| $R^2$ | 0.97 | 0.97 | 0.71 | 0.92 | 0.79 | 0.97 |
| Mean of the dependent variable | 65.2 | 54.7 | 10.5 | 43.1 | 39.8 | 3.3 |
| n (1965-1994) | 30 | 30 | 30 | 30 | 30 | 30 |

* $p < .05$, ** $p < .01$

Numbers in the parentheses are standard errors.

a) The unit is 1,000 Won in the 1990 constant price.

b) The analysis uses values lagged by one year.

Data source: Various annual reports

tive relationships with the rates of advancement to secondary schools, from primary to middle and from middle to high schools (Table 1). On the other hand, only the proportion of the GDP produced in the tertiary sector shows positive relationships with advancement rates from high school to colleges, to junior colleges, and to 4-year colleges / universities (Table 2).

The data show no gender difference in these relationships, and thus the gender gap in school advancement is not affected by the GDP produced in these two sectors. Overall demands for skilled labor in the labor markets

**TABLE A1.** PERCENT EMPLOYED WITHIN ONE YEAR OF GRADUATION

| | Academic HS | | Vocational HS | | Junior college | | College / University | |
|---|---|---|---|---|---|---|---|---|
| Year | Male | Female | Male | Female | Male | Female | Male | Female |
| 1967 | 21.8 | 14.5 | 49.2 | 43.3 | 66.2 | 66.4 | 50.6 | 37.5 |
| 1968 | 20.0 | 15.6 | 51.4 | 82.4 | 70.3 | 70.4 | 55.4 | 41.8 |
| 1969 | 18.2 | 16.8 | 53.5 | 86.4 | 74.4 | 74.4 | 60.3 | 46.2 |
| 1970 | 16.4 | 17.9 | 55.7 | 55.2 | 78.5 | 78.4 | 65.1 | 50.5 |
| 1971 | 15.8 | 19.6 | 55.3 | 54.9 | 81.9 | 89.7 | 59.2 | 46.5 |
| 1972 | 14.4 | 18.2 | 47.9 | 48.2 | 73.6 | 88.3 | 57.0 | 45.8 |
| 1973 | 14.7 | 18.9 | 49.6 | 48.4 | 45.7 | 55.5 | 60.3 | 56.9 |
| 1974 | 13.0 | 18.0 | 55.3 | 53.2 | 39.0 | 28.4 | 64.3 | 53.5 |
| 1975 | 14.9 | 18.7 | 55.9 | 53.5 | 37.6 | 35.6 | 65.4 | 55.4 |
| 1976 | 13.5 | 19.8 | 55.5 | 61.0 | 59.9 | 12.0 | 69.3 | 57.7 |
| 1977 | 12.3 | 18.8 | 59.9 | 65.1 | 46.6 | 46.4 | 71.5 | 53.8 |
| 1978 | 12.8 | 22.3 | 64.4 | 67.3 | 39.6 | 49.8 | 73.8 | 57.1 |
| 1979 | 14.7 | 25.4 | 66.1 | 69.8 | 43.4 | 56.0 | 76.8 | 60.5 |
| 1980 | 11.0 | 21.3 | 54.0 | 62.8 | 36.4 | 50.6 | 69.8 | 55.2 |
| 1981 | 11.9 | 20.9 | 48.9 | 62.7 | 29.7 | 37.7 | 62.3 | 59.3 |
| 1982 | 10.1 | 19.9 | 46.6 | 60.1 | 29.5 | 39.8 | 67.4 | 54.9 |
| 1983 | 9.2 | 23.3 | 45.9 | 59.0 | 34.4 | 44.5 | 61.9 | 51.2 |
| 1984 | 10.4 | 24.1 | 54.3 | 62.6 | 37.2 | 50.9 | 61.6 | 41.7 |
| 1985 | 9.7 | 24.2 | 54.3 | 65.6 | 39.3 | 49.9 | 54.2 | 31.7 |
| 1986 | 10.9 | 23.2 | 58.4 | 68.6 | 37.5 | 52.3 | 48.6 | 29.6 |
| 1987 | 11.3 | 25.5 | 66.1 | 76.3 | 36.9 | 52.9 | 54.4 | 31.0 |
| 1988 | 12.4 | 28.5 | 74.7 | 82.7 | 38.2 | 60.3 | 57.2 | 34.3 |
| 1989 | 13.1 | 30.1 | 79.2 | 85.4 | 39.6 | 63.3 | 58.3 | 39.1 |
| 1990 | 12.5 | 27.1 | 80.0 | 86.7 | 47.6 | 68.2 | 60.3 | 42.6 |
| 1991 | 14.5 | 26.8 | 84.0 | 88.7 | 58.0 | 72.8 | 64.5 | 44.5 |
| 1992 | 17.7 | 26.2 | 85.7 | 88.6 | 57.9 | 71.1 | 63.6 | 44.8 |
| 1993 | 19.8 | 27.9 | 84.8 | 86.6 | 56.9 | 68.9 | 59.8 | 42.6 |
| 1994 | 22.9 | 27.6 | 87.9 | 89.4 | 56.1 | 65.6 | 59.7 | 49.9 |
| 1995 | 24.8 | 28.5 | 90.5 | 91.1 | 61.6 | 70.9 | 68.6 | 47.8 |
| 1996 | 23.8 | 25.9 | 92.0 | 91.4 | 69.2 | 75.3 | 68.7 | 53.4 |

affected school advancement of girls as much as that of boys. One noticeable result is that the proportion of the GDP from the secondary and tertiary sectors shows a negative association with the gender gap in the percentage of high school students in vocational schools (Table 3). Employment rates among vocational school graduates have been high. Among female graduates, employment rates within one year of graduation were at least 60 percent since the mid-1970s, and these rates reached 90 percent in the 1990s (Table a1). Thus, the data suggest that good prospects of employment promote vocational school education for girls, but not for boys.[2] Good employ-

ment prospects of vocational high school graduates helped more parents send their daughters to high schools. On the other hand, the proportion of male high school students who enroll in vocational schools decreased considerably during the same period (Figure 6). Increasing opportunities for higher education among boys may have reduced the enrollment in vocational schools, which prepares students for employment but not for higher education. This is an important finding: that the expansion of high school enrollment among girls was largely through increases in enrollment in vocational high schools.

The trend data in advancement to colleges support our interpretation of the importance of employment prospects for girls' education. Employment prospects are important even though advancement to colleges has been strongly influenced by entrance quota policies. Gaps between male and female high school graduates in their advancement to junior colleges have been much narrower than similar gaps in advancement to four-year colleges / universities (Figures 4 and 5). While educational costs are cheaper, the rates of employment among female graduates have been generally substantially higher for junior colleges than for four-year colleges / universities (Table a1).

Wage patterns reassure the relevance of labor market returns to female schooling. Female to male wage ratios have been highest among the junior-college educated (KMOL various years). During the 1980s, female to male wage ratios increased substantially among the college educated, while they showed minimal increases among the high school or less educated. Between 1980 and 1986, the ratio increased from .69 to .78 among junior-college educated, and from .63 to .71 among four-year college and university educated (KMOL, 1980, 1986).[3] Correspondingly, female students fared well in advancement to junior colleges throughout the 30-year period and in

[2]We estimated regression models that include employment rates within one year of education, but did not present the results, because the data suggest that employment rates are consequences as well as determinants of schooling trends. Employment rates have a positive relationship with high school enrollment rates (vocational or overall) among girls, only when examined with a three-to-five year time lag. When examined in shorter intervals, employment rates and schooling trends have significant negative relationships, which suggests that an expansion of secondary or higher education results in lower employment rates among new graduates. In the case of advancement to colleges, the negative relationship disappears when regressing on employment rates two or more years lagged. With this seemingly mutual causality, the potential positive effects of returns to education on schooling decisions are not always evident.

[3]These numbers are average earnings of all workers over the entire range of work experience and occupations.

advancement to four-year colleges and universities since the late 1980s, as discussed earlier.

Viewed differently, the wage premiums of college education have decreased steadily since the 1970s for male workers, but not for their female counterparts. Wage ratios between male workers with a college education and middle-school or less education went down from about 3.0 in 1973 to about 2.0 by the late 1980s, and to below 2.00 in the 1990s (KMOL various years; KEDI various years). Still, male college entrance rates increased dramatically in the 1980s, though some yearly fluctuations occurred. Thus, the expansion of male college education may, at least partly, have contributed to the decrease in their wage premiums, as did it to employment rates. Regression results in Table 2 show that wage ratios of college to high-school educated male workers do not have a significant effect on college advancement among male youths.

*Educational Policy Explanation*

Both trend data and regression analyses show that educational policies, as measured by entrance quotas and ratios of public expenditures on education to the GDP, are crucial factors in determining college entrance rates. The ratio of public expenditures on education to the GDP does not have a significant effect on advancement to middle schools and to high schools (Table 1). One exception is a positive effect on the percentage of female high school students in vocational high schools (Table 3).

College entrance rates for both males and females corresponded closely to the trends in entrance quotas (Figures 4 and 5). The only discrepancy between the two genders is that male entrance rates moved above those rates suggested by the entrance quotas, whereas female entrance rates moved below those rates. More important, the gender gap in college entrance rates increased, while entrance quotas and public expenditure on education expanded, during the early 1980s. The gender gap decreased after 1987, when the graduation quota system was abolished, and college entrance quotas decreased again. The regression results in Table 2 confirm this positive relationship between public expenditures on education and the gender gap in college entrance. When new openings were available, they were given to boys first. Girls were not given the opportunities first, but in times of shrinking quotas, they were less likely to lose their share. Two explanations are possible. The first is related to success rates in college entrance exams. Even when the quotas reached a peak, a much smaller proportion of girls than of boys were in academic high schools, the track of col-

lege advancement. Thus, girls in the track of college advancement were likely to be a select group who were better qualified academically than were boys in the same track. Statistics show that among college entrance exam takers, girls have higher success rates than boys (KEDI various years). The second explanation is related to the higher returns of female college education than those to male education, as discussed earlier. Thus, by the late 1980s and the early 1990s, parents may have reevaluated their investment in sons' versus daughters' higher education.

*Family Dynamics*

This section first examines whether percentage of household expenditures spent on children's education is related to equality in schooling between boys and girls. The aggregate data of percentage of household expenditures spent on education provide only limited insights on gender relations within the family. However, we speculate that, given a higher priority on sons' education, greater educational expenditures for households may be paralleled with an increase in daughters' education, as rising incomes facilitate female schooling. This speculation is more plausible in the multivariate analysis controlling for the indicators representing national income levels (i.e., the percentages of the GDP produced in the second and tertiary sectors) and the size of public expenditures on education, which affect the private costs of education. The results in Tables 1 through 3 provide support for our speculation.

The bottom panel of Table 1 shows that a greater share of rural household expenditures spent on education significantly increases advancement from primary to middle schools both for sons and daughters, but the effect is larger for girls than for boys, reducing the gender gap significantly. Rural households' educational expenditures also increase advancement from middle to high schools, but the effect is statistically significant only for boys. Reflecting these two results, rural households' educational expenditures show a positive association with high school enrollment for both boys and girls, although only the latter is statistically significant (Table 3). Rural households' educational expenditures show a positive association with the percentage of female high school students in vocational schools, and thus rural educational expenditures reduce the gender gap in those percentages (Table 3).

In contrast to rural households, educational expenditures in urban households have little effect on schooling, the only exception being a negative effect on girls' advancement from primary to middle schools. This negative

effect seems to reflect a trend that girls' advancement to middle schools stagnated during the 1960s, as shown in Figure 3, while the percentage of urban educational expenditures was relatively high. Household expenditures have no effect on advancement to higher education for either gender (Table 2).

To test the hypothesis of marriage market returns, female advancement rates to colleges are regressed on wage premiums to college education among male workers. Table 2 shows that male wage premiums to 4-year colleges and universities have no effect, and such premiums to junior college education has a negative effect on female college advancement, both rejecting the hypothesis of marriage market returns. Rather, male wage premiums to college and university education increase gender gaps in university advancement, suggesting that parents increase the share of family resources allocated to sons (Table 2).

*Family Dynamics from Micro-Level Analysis*

To further explore gender dynamics within the family, we performed supplementary analysis using data on siblings from the same families. Of the sample of 590 families in which at least one parent was aged 60 or older and living in rural areas, our analysis included 331 families where both parents were still alive, with information on their education available. The first two columns of Table 4 show the family characteristics that affect sons' and daughters' years of schooling, and the last column shows those characteristics related to the gap in the mean years of schooling between brothers and sisters.[4] Age is negatively associated with schooling for both genders, and father's age has a positive association with the gender gap. These reflect secular trends of increases in schooling and of decreases in the gender gap. Father's education has a positive effect on schooling for both genders, confirming the effects of family resources on children's education. But, father's education does not reduce the gender gap among siblings. Mother's education, on the other hand, makes a difference in the gender gap. Controlling for father's education, mother's education has no effect on sons' schooling, but has a significant, positive effect on the daughters' schooling, reducing the gender gap.

Number of brothers in the family has a negative effect on sons' schooling, suggesting resource pressures in the family. Interestingly, however, number of brothers has a positive effect on daughters' education. In a social context

[4]The gender gap analysis includes 298 families in which children of both genders exist.

**TABLE 4.** FAMILY CHARACTERISTICS RELATED TO CHILDREN'S YEARS OF SCHOOLING

| Sons | Daughters | | Gapa | | | |
|---|---|---|---|---|---|---|
| Variable | B | s.e. | B | s.e. | B | s.e. |
| Intercept | 13.58** | 0.55 | 13.14** | 0.56 | -0.75 | 1.25 |
| Age/Father's age | -0.06* | 0.01 | -0.15** | 0.01 | 0.05* | 0.02 |
| Father's education | 0.22** | 0.03 | 0.25** | 0.03 | -0.01 | 0.04 |
| Mother's education | 0.01 | 0.04 | 0.17** | 0.04 | -0.13* | 0.06 |
| Number of brothers | -0.18* | 0.09 | 0.19* | 0.10 | -0.33* | 0.14 |
| Number of sisters | -0.09 | 0.08 | -0.16* | 0.07 | 0.06 | 0.12 |
| $R^2$ | | 0.19 | 0.45 | 0.08 | | |
| Mean of the dependent variable | 12.4 | 10.8 | 1.29 | | | |
| n | | 756 | 697 | 298 | | |

* $p < .05$, ** $p < .01$.

a) The dependent variable is gap between the mean years of schooling among brothers and sisters. The analysis includes 298 families with children of both genders.

Data source: Survey of family structure and support systems in rural areas (1993)

where daughters generally receive less schooling than sons, a large number of brothers may effectively set the standard for daughters. Resource pressures due to a large number of brothers may be spread among the brothers. Thus a large number of brothers reduces the gender gap among siblings. On the other hand, a large number of sisters significantly reduced daughters' schooling, but had no effect on sons' schooling, confirming resource pressures among same-sex siblings. These results are not consistent with previous studies in other East Asian societies that find older daughters helping to increase younger siblings' education (Greenhalgh, 1985; Parish and Willis, 1996).

From these cross-sectional findings, we can predict that the gender gap will decrease with increases in mothers' education. However, our findings about the effects of mothers' versus fathers' education are tentative because the sample includes only a small number of highly educated fathers. Fathers in the sample are rural residents, and a majority of them had middle school or lower education. In addition, the positive effect of a large number of brothers on sisters' schooling, and its negative effect on the gender schooling gap, seem plausible only in the context of an overall low level of schooling, big gender schooling gaps, and large sibling sizes. An earlier study in Taiwan finds that the effect of family size on female educational attainment changes under the different regimes of fertility (Hermalin, Seltzer, and Lin, 1982).

## DISCUSSION AND CONCLUSION

This study focuses on trends in gender differences in schooling by school types and levels over the past three decades, and examines four hypotheses to explain them. First, the results broadly confirm the income hypothesis that a rising income reduces gender gaps in schooling. The mean years of schooling of both genders in the adult population decreased during the past three decades, while incomes rose rapidly. Bivariate analyses of time series data show that income reduces the gender gap only in high school enrollment, not in advancement rates of any schools. However, the income trend is correlated with many other socioeconomic indicators, and how they mediate the relationships between income level and gender schooling gaps needs to be further explored.

Second, findings show that labor market circumstances are important for girls' schooling. The multivariate analyses of time-series data show that demand for skilled labor, measured by the proportion of the GDP produced in the secondary and tertiary sectors, raises both boys and girls' advancement from primary to middle schools and from middle to high schools. Demand for skilled labor in service sectors, as measured by the GDP in those sectors, increases advancement rates from high schools to colleges for both gender groups. The proportion of the GDP in the tertiary sector is also positively associated with the proportion of female high school students in vocational schools, suggesting the importance of labor market prospects for girls' schooling.

Although time-series regression analysis does not confirm this, our trend data also indicate that employment rates immediately after graduation are also instrumental to female schooling. Rates of employment within one year of graduation were high for vocational high schools and junior colleges, and these are schools where female enrollment fared well compared to male enrollment. For boys' schooling also, future employment prospects appear to be important, but only in the long term. Regardless of yearly variations in employment prospects immediately after graduation, high premiums to college education seem to be the ultimate force determining male schooling. That is, parents invest in their sons' schooling even in the times of deteriorating short-term returns. Thus, our data suggest that labor market prospects, at least short-term ones, are more crucial for schooling of girls than of boys.

Third, as expected, data show that educational policies set the boundary of school advancements. Although policies such as entrance quotas and

public expenditures on education are gender neutral, they affect boys and girls differently. The outcomes seem to be contingent on other determinants of schooling, such as labor market and family circumstances. When entrance quotas for colleges expanded dramatically during the early 1980s, more positions were given to boys than to girls. However, when the quotas decreased and stabilized since the late 1980s, the shrinkage in entrance rates was slightly smaller for girls. Wage premium of male college graduates decreased during the 1980s, while those of females remained stable. Also, girls may have survived better in college-entrance competitions that became more intensified due to reduced quotas, as displayed by their higher success rates in entrance exams.

Fourth, macro- and micro-level data suggest that family dynamics are definitely a factor in determining gender differences in schooling. However, our regression analysis of female college advancement does not find support for the argument of motivation for marriage market returns. One noticeable finding from the macro analysis is that the percentage of rural household expenditures is positively associated with advancement to middle and high schools for both genders of children.

The micro-level analyses based on sibling data from a 1993 survey of rural households show that mother's education reduces the schooling gap between brothers and sisters within families. Father's education increases both sons' and daughters' schooling, but makes no difference in the gender gap. Resource pressures due to a large number of siblings seem to be spread mostly among same-sex siblings. Thus, one clear implication about temporal trends from the micro-level analysis is that an increase in mother's education will reduce the gender gap in schooling.

To conclude, all four explanations are relevant in explaining gender differences in schooling. The most conspicuous finding, however, is the importance for girls' schooling of employment prospects, especially those within one year of graduation. High employment rates immediately after graduation among female graduates of vocational high schools and junior colleges led female students to comprise a large proportion of those schools over time. Also, sustained high wage premiums to college-educated women in the past few decades, and improvement in female to male wage ratios among the college educated since the 1980s, helped female students maintain their entrance rates that were expanded during the 1980s into the 1990s. On the other hand, our data do not support the argument that women's schooling is for marriage market returns. Our findings clearly demonstrate that labor market returns played a crucial role in expanding women's secondary and higher education in Korea during the past three decades.

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