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Comment on Hahn and Park's Paper

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This paper offers two types of empirical evidence as to the interrelationship among demographic transition, human capital accumulation, and economic growth. Firstly, based on cross-country regression analyses, it suggests that measures of the speed of demographic transition between 1960 and 2004 were positively related to the growth rate during the same period. It also provides that measures of the speed of demographic transition between 1960 and 2000 were positively associated with a measure of the speed of human capital accumulation. The second type of evidence comes from micro Korean Household Survey, from which the authors found a negative relationship between the number of children and the per capita expenditure on education. This result was taken as evidence of "quality-quantity trade-off." This is an ambitious study offering a big picture that encompasses a half century in time horizon and nearly the entire world in geographic coverage. Although I am not an expert in studies of economic growth, this work looks like a highly useful contribution to the literature that attempts to explain economic growth, focusing on the roles played by demographic transition and human capital accumulation.

A major shortcoming of the study an outsider to the field can point out is somewhat wide gap between the endogenous growth theory this study is based upon and the empirical evidence offered in the paper. It is not too difficult to be convinced that the theory leads to the two hypotheses tested by the paper: first, a country with a faster demographic transition experiences a higher rate of per capital income growth; and second, a country with a faster demographic transition experiences a faster human capital accumulation. And the empirical results are consistent with the predictions of the theory. However, it is unclear whether the results were indeed generated by the mechanisms explained in the theoretical model. It is perhaps a limitation arising from a reduced-form analysis. And providing empirical evidence that is consistent with a theory would be an important contribution in its own right. However, paying more attention to what really produced the results would have greatly raised the quality of the paper. More importantly, some attempts could have been made to do so using the same data and empirical framework.

Let me take an example. A decline in fertility in the course of demographic transition could affect the growth rate through two different pathways: by encouraging human capital accumulation, and by increasing the share of the working-age population. It looks like that the relationship between demographic change and human capital accumulation is a more critical element of economic growth emphasized in the theoretical model, rather than the effect of population composition. In the current regression analyses of GDP growth rate, reported in Table 4, measures of fertility change (denoted SFERTIL in the paper) and schooling are included in the set of independent variables, whereas no

variable is included pertaining to the share of working-age population (denoted SWRATIO in the paper). Given that the measures of schooling represent the magnitude of human capital accumulation, the estimated regression coefficient of SFERTIL captures the following two effects combined: first, the effect of changing human capital accumulation not explained by rising school enrolment, and second, the effect of change in SWRATIO. It would have been a better test of the theory if SFERTIL and SWRATIO were included simultaneously, and the measures of education were excluded from the regressions. This alternative specification would have helped determine the pure effect of fertility change through human capital accumulation in all forms, including schooling.

The empirical analyses are conducted carefully in general, but there are rooms for further improvements. A cross-country growth regression, as in the case of this study, often confronts a problem of potential endogeneity bias, because economic growth and other social transformations associated with it, such as urbanization and changing social norms, are major causes of fertility decline. This paper addresses this endogeneity issue by employing GMM estimations. However, it is not fully discussed in the paper whether the instrumental variables (IVs) used in the estimations, such as working-age population ratio in 1960, life expectancy in 1960, and female labor force participation rate in 1960, are valid IVs. More detailed discussions as to how the IVs were chosen would have made the results more convincing. An alternative approach to this problem would be to allow a time lag between demographic change and economic growth by dividing the period under study into two sub-periods.

I would also like to make several points regarding the analyses of the Korean Household Survey given in the paper. First, the number of family members other than children should have been included in the regression model. If higher-income families have more dependents to support, the omission of this variable could produce the strange negative relationship between income and per-child educational expenditure, admitted as an unexplainable result in the paper. Second, employment status of the mother should have been taken into account. If working women tend to have fewer children, the number of children may capture the effect of mother's labor-market status. In this case, the negative effect of the number of children on educational expenditure could be explained differently. Given that mother's time and money are substitutes in children's human capital accumulation, a working mother may replace her time by spending more money. Finally, the negative relationship between the number of children and per-child spending on education could be explained to some extent by economies of scale in educational expenditure.

Overall, this is a good paper tackling big questions regarding economic growth. I hope that this work will be developed into a larger research project that provides more detailed discussions of the mechanisms that produced the observed interrelationship among demographic changes, human capital accumulation, and economic growth. Looking into the cases of particular countries would also be a promising direction of extension.