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*Differential Borrowing Constraints and Investment in Human Capital**

This paper investigates the way differences in the ability to borrow against future income affect the human capital accumulation process. By employing a general equilibrium model, it is shown that, as the fraction of a country's population constrained from borrowing increases, individuals invest less time in education, and thus the country-wide human capital declines. Empirical evidence offers support to the developed hypothesis. It is also shown that in countries characterized by high levels of government spending on education, borrowing constraints tend to be less pervasive for human capital accumulation than ones in which public spending on education is relatively low.

1. Introduction

The role of borrowing constraints and their interaction with a number of macroeconomic variables has received considerable attention in the literature. Particular emphasis has been given to the links between the severity of borrowing constraints and consumption or saving (Flavin 1985; Mariger 1986; Hubbard and Judd 1988; and Zeldes 1989), and on the implications of borrowing constraints for economic development and growth (Vaidyanathan 1993 and Jappelli and Pagano 1994). In addition, empirical work has identified significant agent heterogeneities with regard to the ability to borrow, and has recovered evidence consistent with the existence of fractions of the population that are not able to use the financial markets for intertemporal consumption smoothing (Hayashi 1985; Campbell and Mankiw 1989; Jappelli and Pagano 1989; and Vaidyanathan 1993). Although most of these studies have focused on identifying the severity of borrowing constraints in industrial countries for which data limitations are less profound, Vaidyanathan (1993) provided estimates of the fraction of the consumers who are constrained from borrowing for a sample of 59 countries, which includes both industrial and developing countries.[1]

This paper adds to the literature of borrowing constraints by examining

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[1]Estimates of this fraction range from 0% in the case of Singapore and Sweden to 100% in the cases of Ethiopia, Mali and Uganda.

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the effects of agent heterogeneity, in the form of differences in the ability to borrow, on the human capital accumulation process. The paper also presents updated estimates of the fraction of consumers that are constrained from borrowing against future income. The premise of the paper is that decisions about human (and physical) capital investment are seriously influenced by the ability of people to borrow against future income. Individuals unconstrained from borrowing would have the opportunity to borrow from the capital markets and invest in human capital in the early years of life, while those not able to borrow may have to attend school only part-time, work more and thus decelerate their education. Consequently, depending on the severity of borrowing constraints, both the individual and the country-wide levels of human capital would be affected, with obvious implications for growth.[2]

The employed framework consists of a three-period overlapping generations (OLG) model which incorporates agent heterogeneity in the form of differences in the ability to borrow. Two types of agents are considered—individuals constrained from borrowing at the prevailing interest rate and others who do not face any upper limit on borrowing. In a framework where education adds to the earning ability of the people who undertake it, it is shown that as the fraction of the population that is constrained from borrowing increases, both the economy-wide time invested in education and the country's human capital decline. Moreover, aggregate saving increases and so do the capital-effective labor ratio and the output per unit of effective labor.

The hypothesis that the severity of borrowing constraints is inversely related to human capital is subjected to formal testing for a sample of 78 countries. Regression results support the hypothesis, and also point to the conclusion that borrowing constraints are more profound in countries with relatively low government spending on education. Moreover, when moving from countries of low educational spending to ones characterized by high spending, borrowing constraints become less profound. One possible explanation could be that high spending on education may imply the existence of student-aid mechanisms, which help alleviate constraints associated with the financing of education.

The rest of the paper is organized as follows. Section 2 presents the theoretical framework and the solution algorithm. Section 3 discusses how

[2]The most important growth-promoting mechanisms cited in the literature are: investment in human capital (Azariadis and Drazen 1990; Fischer 1991; and Dellas and de Varies 1995); endogenous technology and new goods (Romer 1986 and Lucas 1988); investment in physical capital (DeLong and Summers 1990); knowledge spillovers (Romer 1989); and international trade (Krueger 1974; Grossman and Helpman 1989; and Murphy, Shleifer and Vishny 1990).