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The risk properties of human capital and the design of government policies

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Abstract

Whether human capital increases or decreases earnings uncertainty is an open question from an empirical standpoint. Yet, most policy prescriptions regarding human capital formation are based on models that *impose* riskiness on this human capital investment. In this paper we extend the dynamic Mirrlees taxation framework to include investments in human capital and derive prescriptions that are robust to the risk characteristics of human capital. Savings should be discouraged, human capital investments encouraged and both types of investment driven to an efficient level from an aggregate perspective. These prescriptions are also robust to whether investments are individually observed or not.

JEL classification: H21; H24

Keywords: Education; Optimal taxation; Endogenous policy instruments

1. Introduction

This paper extends the results on dynamic Mirrlees (1971) taxation to include investments in human capital. It takes on the theoretical connection between risk characteristics of human capital investment, optimal taxation and optimal educational policy, which was first established in the seminal paper of Eaton and Rosen (1980).[1]

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[1] Hamilton (1987) is an important extension of Eaton and Rosen (1980) in which labor supply responses after the realization of uncertainty are allowed.

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Human capital investment is described in the literature as a life long choice subject to a great deal of idiosyncratic uncertainty against which no markets exist to insure. Moreover, provided that human capital is risky, the private optimum level of investment will be lower than the social optimum. Optimal policies derived under these assumptions will then prescribe the use of a proportional labor income tax to increase the agents' expected utility and educational subsidies to ameliorate the problem of under-investment in human capital.

The relevant and still unanswered empirical question[2] is, therefore, whether the return on human capital is risky, i.e., whether, at the margin, most of the increase in productivity takes place when the marginal utility of consumption is lower. As pointed out by Hamilton (1987, p. 380): "The basic requirement for the result [social welfare is increasing in human capital at the optimum private choices] is that the marginal return to human capital remains high for favorable states of the world in which marginal utility of income is low."

We build a two periods model along the lines of Hamilton (1987), which extends Eaton and Rosen (1980) by allowing for labor supply responses later in life, but follow the new dynamic public finance literature in considering policy instruments that are endogenously determined. After describing the informational structure of the economy, optimal policies are derived in two steps. First, we use the revelation principle to determine optimal allocations by means of a truthful revelation direct mechanism. Then, we characterize tax instruments capable of implementing such allocations.[3]

As it turns out, with fewer restrictions on preferences we are able to show that savings should be set below and human capital investments above what would be privately chosen, *independently* of whether investment in human capital increases or reduces wage risk. Risk sharing is taken care of by the non-linear income tax schedule. The role of other instruments is simply to relax the incentive compatibility constraints associated with the direct mechanism by punishing off-equilibrium behavior. What we show is that agents who intend to announce falsely their productivities invest less in education and save more than agents who intend to abide by the rules, regardless of the risk characteristic of human capital.

Another property of optimal policies is the aggregate efficiency for both types of investment: Physical and human capital. On the one hand, agents private choices are distorted, while on the other the aggregate return is determined by a condition compatible with the prescription of no capital income taxation of Judd (1985), Chamley (1986) and Lucas (1990). This result is in contrast with the prescriptions found in Anderson and Anderberg (2003) where risk-enhancing (reducing) human capital should be set at a level which is lower (higher) than the unconstrained efficient level.

As for implementation, our results parallel those of Albanesi and Sleet (2005), Golosov and Tsyvinski (2004) and Kocherlakota (2004): Neither do education subsidies substitute for compulsory education nor does capital income taxation substitute for savings control. We characterize implementation via taxes and show that marginal tax rates on the return of both forms of investment must depend on the second period labor output.

[2]E.g., see Anderson and Anderberg (2003) for a brief survey.

[3]Agency approaches to deal with human capital choices are found as early as Hare and Ulph (1979). However, risk is altogether eliminated by their collapsing choices in a single period, the same procedure followed by Brett and Weymark (2000) and Bovenberg and Jacobs (2005). In Kapicka (2004) uncertainty regarding human capital investment is eliminated from a fully dynamic model by the assumption that productivity is known from the start.