

Optimal accumulation in an endogenous growth setting with human capital

Frédéric Docquier^{a, b, *}, Oliver Paddison^c, Pierre Pestieau^{d, e, f}

^a*FNRS, IRES, Department of Economics, Catholic University of Louvain, 3 Place Montesquieu, B-1348 Louvain-La-Neuve, Belgium*

^b*IZA, Germany*

^c*ECLAC, United Nations Commission for Latin America and the Caribbean, Economic Development Unit, 1 Chancery Lane, Port of Spain, Trinidad and Tobago*

^d*CREPP, University of Liège & CORE, Department of Economics, 7 Boulevard du Rectorat (B31), B-4000 Liège, Belgium*

^e*PSE, France*

^f*CEPR, UK*

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Abstract

This paper considers a three-overlapping-generations model of endogenous growth wherein human capital is the engine of growth. It first contrasts the *laissez-faire* and the optimal solutions. Three possible accumulation regimes are distinguished. Then it discusses a standard set of tax-transfer instruments that allow for decentralization of the social optimum. Within the limits of our model, the rationale for the standard pattern of intergenerational transfers (the working-aged financing the education of the young and the pension of the old) is seriously questioned. On pure efficiency grounds, the case for generous public pensions is rather weak.

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1. Introduction

Since Diamond [9], it is well known that the *laissez-faire* capital accumulation path needs not be dynamically efficient in the overlapping generations economy with selfish agents. In case

* Corresponding author. Department of Economics, IRES, Université Catholique de Louvain, 3 Place Montesquieu, B-1348 Louvain-La-Neuve, Belgium. Fax: +32 10 47 39 45.

E-mail addresses: docquier@ires.ucl.ac.be, f.docquier@skynet.be (F. Docquier).

of overaccumulation, intergenerational arrangements can be used to increase the welfare of all (present and future) generations. The golden rule steady state defines the frontier of Pareto efficient solutions. However, such a golden rule is hard to transpose to growing economies where consumer expenditures are increasing over time. Introducing a social welfare function is useful to discriminate among all efficient solutions. On the balanced growth path, the modified golden rule applies.

The problem is more complex when the rate of growth is endogenous. Suppose human capital is the engine of growth. Then, two sources of inefficiency are likely to interact. First, for a given social rate of time preference, individual saving decisions do not generate the appropriate amount of physical capital accumulation. Second, educational investments tend to be insufficient because the private value of human capital is lower than its social value by the positive externality it exerts on future generations. In this paper we analyze the optimal path of accumulation in such an endogenous growth setting and compare it to the market allocation. We then turn to policy issues and investigate the role of intergenerational transfers. The case for generous public pensions and education subsidies is seriously questioned.

Our endogenous framework is appropriate to assess the role of the intergenerational transfers. The new growth literature has stressed the role of human capital on sustained growth (see Lucas [13], Romer [15], Barro et al. [2]). Despite discouraging empirical results obtained in the 1990s (data sets used in the 1990s reveal a number of suspicious features and inconsistencies), recent empirical studies find a clear positive correlation between human capital and growth (see Cohen and Soto [5], De la Fuente and Domenech [8], Coulombe and Tremblay [6]).¹ This empirical literature leaves intact the critical issue of why and how human capital is (or should be) accumulated. Abstracting from considerations of myopia, liquidity constraints and redistribution, we build a three-overlapping-generations model of endogenous growth which explains education and saving decisions. As in Michel [14], De la Croix and Michel [7] and more recently Boldrin and Montes [3,4], agents live for three periods. In the first, they incur some education cost which is financed by borrowing on the financial market. In the second period, they work with their labor supply being fixed and their wage depending on their educational investment and also on the overall level of human capital. Their earnings are used to finance current consumption, refund the amount borrowed for their education and save for retirement. In the third period, they retire. Contrary to the above studies, the current paper uses very general production and utility functions.² Focusing on balanced growth solutions, we demonstrate that three regimes can be observed. On the one hand, the market amount of capital per worker can be higher or lower than the optimal amount (overaccumulation or underaccumulation of physical capital). On the other hand, the laissez-faire growth rate can be lower or higher than the optimal growth rate (underaccumulation or overaccumulation of human capital). The educational externality induces two major consequences: (i) the case with overaccumulation of human capital and underaccumulation of physical capital cannot be observed, and (ii) the optimal solution will never be reached in the market economy.

Regarding decentralization, we investigate how education subsidies and intergenerational transfers can be used to restore optimality. It seems surprising that there have been few attempts to combine these two important aspects of the intergenerational state in a unified framework. Docquier and Michel [10] introduce public pensions and education subsidies in a setting with two types of human capital investments (education expenditures and time spent at school). Investigat-

¹ Cohen and Soto [5] obtain a 8.5% rate of return on education (to be compared with 4.6% for physical capital) which is fairly compatible with the Mincerian microeconomic literature.

² Azariadis and Drazen [1] develop a model in the same vein but with human capital produced out of foregone labor.

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