

Optimal human capital policies[☆]

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Abstract

We analyze optimal income taxes and optimal schooling subsidies in a dynamic private information economy with observable human capital accumulation. We show that under plausible conditions the marginal schooling subsidies are positive and that they are zero at both endpoints of the skill distribution.

We compute the optimal policies and evaluate their impact over the transition and at the steady state. We find that the optimal schooling policies are significantly smaller than the optimal marginal income taxes. If optimal schooling policies are introduced jointly with optimal income taxes then their welfare and aggregate effects are small. However, if income taxes are not set optimally then the optimal schooling policies have significant welfare and aggregate effects.

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1. Introduction

We analyze optimal government policies in an economy where agents are heterogeneous in their abilities to work, but can also invest in human capital to augment their skills. We assume that agents' abilities are their private information. The unobservability of abilities by the government creates a friction that provides a foundation for optimal income taxes and optimal educational subsidies.

If there are no informational frictions, it is optimal for the allocations to satisfy two conditions. The first equates the marginal rate of substitution between consumption and leisure to the wage rate. The second equates marginal costs of investment in human capital to the marginal benefits of doing so. The second condition is expressed in terms of an Euler equation for human capital. Static models with private information show that the efficient allocation creates a wedge between the wage and the marginal rate of substitution.

In this paper we analyze whether private information also creates distortions in the Euler equation for human capital. We define an intertemporal human capital wedge in the Euler equation as a wedge between the

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marginal costs of investment in human capital and the marginal benefits of such an investment. We find that a positive human capital wedge is efficient as long as it is optimal to increase over time the agent's non-leisure time and labor supply relative to schooling. A positive human capital wedge means that the marginal cost of investment in human capital is, in the optimum, larger than the marginal benefit. We interpret the optimal human capital wedge as a foundation for positive schooling policy subsidies.

The intuition behind optimal positive schooling subsidies is as follows: since marginal income taxes are positive, the second best labor supply is distorted downwards. In the absence of schooling subsidies, schooling is undistorted relative to labor supply and hence it is distorted downwards compared to the first best schooling. By introducing positive schooling subsidies, the government reduces the schooling distortion at the expense of introducing a new distortion of schooling relative to labor supply. We show that such trade-off is in general welfare improving.

We show that the efficient allocation can be implemented by a tax system where taxes each period depend on the past history of incomes and human capital levels. We provide a quantitative characterization of the optimal policies. Numerical simulations show that the optimal marginal income tax schedule varies very little over time. For the majority of the population optimal marginal income taxes lie between 40% and 65%. The marginal schooling subsidy schedule also changes very little with time. Unlike marginal tax rates, the optimal marginal schooling subsidy is relatively small, lying between 0% and 20% of human capital for most of the population.

To isolate the effects of schooling subsidies from the effects of optimal income taxes, we also consider two alternative, partial policy reforms. We first exogenously restrict the schooling policies to be zero. We find that the quantitative effects of optimal schooling subsidies are very small: the welfare gain from introducing schooling subsidies on top of the optimal income tax schedule is only 0.3% in terms of consumption equivalents. Similarly, the effect on aggregate output is small.

We then study optimal schooling policies when income taxes are exogenously given by a flat tax of 40%. We find that in such a case the welfare gain from schooling subsidies is significantly larger, being 8.8% in terms of consumption equivalents. The aggregate effects of optimal schooling policies are also more significant: the aggregate steady state output is about 9.9% higher than if only the flat income tax is used. These results imply that schooling subsidies may be an important policy tool and can significantly increase welfare if income tax policies are not optimal.

1.1. Related literature

This paper connects two strands of literature. The first one builds on [Mirrlees's \(1971, 1976, 1986\)](#) framework where private information about one's abilities provides a foundation for optimal income taxes. This framework has been recently extended to dynamic environments with physical capital by [Golosov et al. \(2003\)](#), [Kocherlakota \(2005\)](#), [Werning \(2007\)](#) and [Albanesi and Sleet \(2006\)](#). One of their main findings, that capital income taxes should be zero only if individual abilities are permanent is reflected in our implementation where the social planner allows the agents to borrow and save without any restrictions. In these papers, optimal allocations exhibit positive intertemporal wedge between the marginal costs of saving and marginal benefits of doing so. Although this wedge is quite distinct from our intertemporal human capital wedge, the intuition for why both wedges are positive is similar. A positive intertemporal wedge (and positive capital taxes) exists in order to decrease incentives to save. Lower savings is beneficial because it induces higher labor supply in the future. A positive human capital intertemporal wedge (and positive schooling subsidies) exists in order to increase investment in human capital. Higher human capital investment increases the marginal product of labor in the future and therefore induces higher labor supply in the future, in the same manner as lower savings.

Dynamic private information economies with endogenous human capital formation were considered by [Kapicka \(2006, 2007\)](#) where the setting was simplified by the assumption that human capital was unobservable or equivalently no schooling policies were feasible. This paper extends these results by assuming that human capital is observable and thus allows a richer set of government policies. [Grochulski and Piskorski \(2005\)](#) study a two-period economy where the agent's skills are also affected by human capital accumulation. Their environment allows for more general ability shocks but no direct schooling policies are feasible since human

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