

# Pareto efficient income taxation with stochastic abilities <sup>☆</sup>

Marco Battaglini <sup>a</sup>, Stephen Coate <sup>b,\*</sup>

<sup>a</sup> *Department of Economics, Princeton University, Princeton, NJ 08544, United States*

<sup>b</sup> *Department of Economics, Cornell University, Ithaca, NY 14853, United States*

Received 26 May 2006; received in revised form 5 June 2007; accepted 7 June 2007

Available online 25 July 2007

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## Abstract

This paper studies Pareto efficient income taxation in an economy with finitely-lived individuals whose income generating abilities evolve according to a two-state Markov process. The study yields three main results. First, when individuals are risk neutral, in any period the only individuals whose earnings are distorted are those who currently are and have always been low ability. In addition, the degree to which these perpetual low ability types have their earnings distorted decreases over time, converging to zero if the time horizon is long enough. Second, the earnings distortions are continuous with respect to the degree of risk aversion at the risk neutral solution. Third, Pareto efficient income tax systems can be time consistent even when the degree of correlation in ability types is large. The condition for time consistency suggests a novel theoretical reason why the classic equity–efficiency trade off may be steeper in a dynamic environment than previously thought.

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*Keywords:* Optimal taxation; New dynamic public finance

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## 1. Introduction

This paper explores the nature of Pareto efficient income taxation in a dynamic economy in which individuals' income generating abilities, while persistent, may change over time. In any period, an individual can have either low or high ability and abilities evolve according to a Markov process. The government has an exogenous revenue requirement in each period and, in addition, has the distributional objective of ensuring that those individuals who start out with low ability achieve at least some target level of lifetime expected utility. The government would like to achieve its distributional and revenue raising goals efficiently, but is unable to observe individuals' income generating abilities.

The analysis yields three main results concerning efficient income tax systems in this environment. First, when individuals are risk neutral, in any period the only individuals whose earnings are distorted are those who currently are

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<sup>☆</sup> We are grateful to Narayana Kocherlakota for detailed comments and general enthusiasm for the topic. For helpful feedback, we also thank two anonymous referees, Christophe Chamley, V.V. Chari, Per Krusell, Emmanuel Saez, and seminar participants at Boston University, the Minneapolis Fed, NBER, Ohio State, Princeton, Rochester and Yale. Marco Battaglini gratefully acknowledges financial support from an NSF CAREER Award (SES 0547748).

\* Corresponding author.

*E-mail addresses:* [mbattagl@princeton.edu](mailto:mbattagl@princeton.edu) (M. Battaglini), [sc163@cornell.edu](mailto:sc163@cornell.edu) (S. Coate).

and have always been low ability. This is a declining fraction of the population, converging to zero if the time horizon is long enough. In addition, the degree to which these perpetual low ability types have their earnings distorted decreases over time, also converging to zero if the time horizon is long enough. Thus, in a very strong sense, the distortions caused by efficient income tax schemes vanish over time when individuals are risk neutral.

Second, when individuals are risk averse, the result that the only individuals whose earnings are distorted are those who currently are and have always been low ability no longer holds. However, earnings distortions are continuous with respect to the degree of risk aversion at the risk neutral solution. Accordingly, long run distortions converge to zero as the degree of risk aversion converges to zero.

Third, in the risk neutral case, efficient income tax systems can be “time consistent” in the sense that they cannot be Pareto dominated as information about individuals’ abilities is revealed over time. Specifically, there is a lower bound on the correlation in abilities such that below it the efficient tax system cannot be Pareto dominated. When the correlation of abilities is above this bound, it is governments with higher spending commitments and/or more ambitious redistributive objectives who find it harder to commit to implement efficient income tax systems. Accordingly, it is governments with more progressive agendas that will be forced to pursue their objectives with third best policies. Since these will lead to greater distortions and larger reductions in aggregate efficiency than second best policies, the result suggests that the equity–efficiency trade off may be steeper in dynamic environments than previously thought.

The paper builds on a vast literature on optimal income taxation stemming from the seminal analysis of Mirrlees (1971). Indeed, the model is a dynamic version of the classic Mirrlees model with two ability types. The two-type Mirrlees model has been used extensively in the literature to illustrate the basic principles of efficient taxation (see, for example, Stiglitz, 1982, 1985a). It is particularly tractable because efficient tax systems can be characterized by maximizing the utility of high ability types subject to a target utility for low ability types, a resource constraint, and a pair of incentive constraints. This paper extends this well known model to a dynamic, stochastic environment.

Even with only two ability types, introducing dynamics and allowing for the possibility that individuals’ abilities change over time significantly complicates the optimal taxation problem. In the static model, the source of distortions is the government’s desire to redistribute from high to low ability individuals. If the target utility level for low ability individuals is sufficiently high, high ability individuals will have an incentive to reduce their earnings to masquerade as low ability individuals. To mitigate this possibility, income tax systems must optimally screen ability types which requires distorting the earnings of low ability individuals downwards. This *redistributive* source of distortions remains in the dynamic model if the target utility level for those who start out with low ability is sufficiently high. However, if individuals are risk averse, an additional *insurance* source of distortions arises. Even individuals who start out with high ability face uncertainty about their future income generating possibilities. Ideally, the government would like all individuals to be fully insured from future ability shocks. But efficiency also requires that higher ability individuals should provide more labor. Distortions arise from the tension between these two goals.

In interpreting the findings of this paper, it is important to note that the insurance source of distortions is not operative when individuals are risk neutral. Accordingly, the results for the risk neutral case are informative about the dynamic behavior of the distortions arising purely from the government’s desire to redistribute from the initially high ability to the initially low ability. When individuals are risk averse, the insurance source of distortions is also present and this is why the pattern of distortions is more complex.

The focus on the dynamic pattern of distortions arising from the government’s desire to redistribute distinguishes this paper from much of the other work in the *New Dynamic Public Finance* literature.<sup>1</sup> Papers in this literature have been primarily concerned with understanding the pattern of distortions resulting from the government’s desire to provide insurance. Individuals are treated as ex ante identical and the government’s problem is to maximize the expected utility of a representative agent. The redistributive source of distortions familiar from the static literature is absent in this formulation. Moreover, the literature has focused on understanding the pattern of distortions in the allocation of consumption across time and states, remaining silent on the pattern of earnings distortions.

<sup>1</sup> This literature studies optimal policy in dynamic Mirrlees models. It is distinct from the “traditional” approach to dynamic optimal taxation that makes the assumption that the government is constrained to use linear taxes (see Chari and Kehoe, 1999 for a review). For a useful review of recent work see Kocherlakota (2006). Earlier papers in this style include Brito et al. (1991), Diamond and Mirrlees (1978), Ordober and Phelps (1979), Roberts (1984) and Stiglitz (1985b). See also Berliant and Ledyard (2003) who characterize time consistent taxation in a two period model with constant ability types.

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