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Optimal asset taxes in financial markets with aggregate uncertainty

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ABSTRACT

This paper studies Pareto-optimal risk-sharing arrangements in a private information economy with aggregate uncertainty and ex ante heterogeneous agents. I show how to implement Pareto optima as equilibria when agents can trade claims to consumption contingent on aggregate shocks in financial markets. The first result is that if aggregate and idiosyncratic shocks are independent, the implementation of optimal allocations does not require any interventions in financial markets. This result can be extended to dynamic settings in the sense that, in this case, only savings need to be distorted, but not trades in financial markets. Second, I characterize optimal trading distortions in financial markets when aggregate and idiosyncratic shocks are not independent. In this case, optimal asset taxes must be higher for those securities that pay out in aggregate states in which consumption is more volatile. For instance, this can provide an efficiency justification for the frequently observed differential tax treatment of different asset classes, such as debt and equity claims.

1. Introduction

Individual households face substantial economic risk over their lifetimes in the form of both idiosyncratic and aggregate uncertainty. For instance, individuals' employment, income, health status and mortality are all subject to idiosyncratic shocks and to economy-wide shifts in unemployment rates, wages, technology and life-expectancies. The two kinds of shocks have very different implications for risk-sharing, though. Whereas individuals can influence their idiosyncratic uncertainty by taking unobservable actions, aggregate risk is not typically related to such private information problems. Moreover, aggregate uncertainty is harder to smooth by pooling risks than idiosyncratic uncertainty. Yet there do exist opportunities for smoothing even aggregate risk when aggregate shocks have different effects on different agents in the economy. For instance, country-specific aggregate shocks may only affect agents in one country, not those abroad. A recession may increase unemployment rates in some sectors of the economy more than in others, and changes in wages and mortality rates have different impacts on elderly, retired agents than on young workers.[2]

In this paper, I ask how idiosyncratic and aggregate risk should be shared optimally among different groups in the economy. I consider a model where ex ante heterogeneous agents are subject to both aggregate and idiosyncratic shocks.

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[2] Attanasio and Davis (1996) provide overwhelming empirical evidence for consumption insurance opportunities between birth cohorts and education groups in the US. Storesletten et al. (2004) also find that intergenerational sharing of aggregate risk is quantitatively important.

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Individuals can influence their probability distribution over idiosyncratic shocks by choosing some hidden effort, leading to a standard moral hazard problem. Aggregate shocks, by contrast, are assumed to be exogenous and to affect all agents' outputs and probability distributions over idiosyncratic shocks, but in potentially different ways. If agents' preferences over consumption and effort are separable, any Pareto-optimal risk-sharing arrangement in this private information economy has to be such that the ratios of expected inverse marginal utilities between different agents are independent of aggregate shocks.

I use this efficiency condition to study the role of financial markets in my economy, where agents exchange claims to consumption contingent on aggregate shocks. In practice, agents are able to insure considerable parts of the aggregate risk that they are exposed to by trading such financial assets. For instance, agents can hedge country-specific risk by buying foreign assets, and workers in a given sector can buy shares of companies in other sectors to reduce their overall exposure to the effects of aggregate shocks on their own sector. In general, Pareto-optimal risk-sharing arrangements are inconsistent with agents having free access to such financial markets since trading in financial markets leads to the equalization of ratios of expected marginal utilities across different agents rather than expected inverse marginal utilities.

However, I show that there exists an important benchmark case where this conflict disappears: If aggregate and idiosyncratic shocks are stochastically independent, so that aggregate shocks may affect individual outputs in arbitrary ways, but not the distributions of idiosyncratic risk, then any Pareto optimum in my economy can be implemented without interventions in financial markets. Simple group-specific income transfers that condition on aggregate shocks and individual outputs are sufficient in this case. I also show that this result generalizes to a dynamic setting where agents can save in capital in addition to trading in financial markets. In this case, the result is that only savings need to be distorted in order to implement constrained-efficient allocations, but not trades in financial markets, whenever aggregate and idiosyncratic risk are independent.

The intuition relies on the fact that, in any Pareto optimum, marginal utilities depend on aggregate shocks through two channels. First, as in standard moral hazard models, it is optimal to allocate marginal utilities to agents according to likelihood ratios, which generally vary with aggregate shocks. However, if aggregate and idiosyncratic shocks are independent, aggregate uncertainty leaves the distribution of likelihood ratios unchanged. Second, aggregate shocks affect aggregate output in the economy. Variations in aggregate output, however, shift marginal utilities uniformly across agents at any Pareto optimum. Hence, if aggregate and idiosyncratic shocks are independent, aggregate states are symmetric in terms of the marginal resource costs of providing incentives, and it is optimal to leave marginal rates of substitution between aggregate states undistorted. This in turn is consistent with free trading in financial markets.

Second, I characterize optimal distortions in financial markets when aggregate shocks do affect distributions of idiosyncratic shocks. In this case, taxes on transactions in financial markets are able to implement Pareto optima. In particular, I show that the resulting marginal taxes must be higher for those financial assets that pay out in aggregate states in which likelihood ratios and hence consumption are more risky. With undistorted financial markets, agents would "self-insure" against this risk by buying additional consumption for these aggregate states in financial markets. The optimal distortions are designed to prevent agents from doing so.

In particular, the optimal asset tax schedule derived here can provide an efficiency based justification for a differential tax treatment of different asset classes, a feature shared by many real-world tax systems. For instance, I discuss an example in which equity claims pay out relatively more in aggregate states with more volatile consumption compared to fixed income securities, which pay out in states in which it is optimal to provide more insurance across idiosyncratic shocks. In this case, optimal asset taxes are higher on equity claims compared to debt claims. Indeed, the deductibility of interest on debt payments from the corporate tax base in many tax systems leads to a situation where equity claims are effectively taxed at a higher rate than debt claims, consistent with the optimal pattern derived here.

Related literature. This paper builds on the literature studying and testing optimal risk-sharing arrangements in economies with heterogeneous agents but without private information, as pioneered by Borch (1962), Wilson (1968), Townsend (1994) and Attanasio and Davis (1996). I demonstrate how the first-best risk-sharing rules derived there have to be modified when idiosyncratic risk is subject to moral hazard, so that risk sharing has to be traded-off against the provision of incentives. In that respect, this paper shares a common goal with the contribution by Demange (2008) who also considers a moral hazard model with aggregate uncertainty and discusses properties of risk-sharing rules under various assumptions on preferences and for a numerical example. However, financial markets are absent from her analysis, so that the implications of efficient risk sharing for optimal tax policy in financial markets presented here are not considered.

My analysis of a moral hazard model with aggregate uncertainty and of its implications for tax policy in financial markets is also related to a large literature that studies the optimal taxation of capital income in dynamic private information economies with idiosyncratic shocks. In these models, the Inverse Euler equation is derived as an intertemporal optimality condition and used to obtain implications for optimal savings distortions.[3] I establish an analogous optimality condition

[3] See, for instance, Diamond and Mirrlees (1978), Rogerson (1985), Ligon (1998), Golosov et al. (2003), Farhi and Werning (2009) and Weinzierl (2011). With the exception of Rogerson (1985) and Ligon (1998), these contributions consider optimal tax models with private skill shocks rather than moral hazard models. While the Inverse Euler equation has been shown to emerge in both private information and hidden action models, the hidden action framework considered here allows to derive the implications of aggregate uncertainty for constrained efficiency and financial markets in a particularly transparent way (see Section 4.1 for a discussion).