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Machines, buildings, and optimal dynamic taxes

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ABSTRACT

The effective taxes on capital returns differ depending on capital type in the U.S. tax code. This paper uncovers a novel reason for the optimality of differential capital taxation. We set up a model with two types of capital – equipments and structures – and equipment-skill complementarity. Under a plausible assumption, we show that it is optimal to tax equipments at a higher rate than structures. In a calibrated model, the optimal tax differential rises from 27 to 40 percentage points over the transition to the new steady state. The welfare gains of optimal differential capital taxation can be as high as 0.4% of lifetime consumption.

1. Introduction

In the U.S. corporate tax code, the effective marginal tax rates on returns to capital assets show a considerable amount of variation depending on the capital type. For instance, according to Gravelle (2011), the effective marginal tax rate on the returns to communications equipment is 19%, whereas it is above 35% for non-residential buildings.[1] This feature of the tax code has been the subject of numerous reform proposals since the 1980s. Recently, President Obama called for a reform to abolish the tax rules that create differential taxation of capital assets in order to "level the playing field" across companies.[2] Many economists have argued in favor of the proposals to abolish tax differentials following an efficiency argument first raised by Diamond and Mirrlees (1971): taxing different types of capital at different rates distorts firms' production decisions, thereby creating production inefficiencies.

This paper takes a step back and reassesses whether differential taxation of capital income is a desirable feature of the tax code. Theoretically, the paper uncovers a novel economic mechanism that calls for optimality of differential capital asset taxation, but with an important caveat. In the current U.S. tax code, the effective tax rate on equipment capital (i.e., mostly machines) is on average 5% below the effective tax rate on structure capital (i.e., mostly non-residential buildings). In contrast, our theory suggests that capital equipments should be taxed at a higher rate than capital structures. We conduct a quantitative exercise to assess the quantitative importance of optimal differential capital taxation. In our baseline calibration, the tax rate on capital equipments should be at least 27 percentage points higher than the tax rate on capital

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[1] The capital tax differentials are created through tax depreciation allowances that differ from actual depreciation rates. Appendix A explains this in detail and provides further information on the historical evolution of capital tax differentials in the U.S. tax code.

[2] The 2011 U.S. President's State of the Union Address. Retrieved from http://www.whitehouse.gov/the-press-office/2011/01/25/remarks-president-state-union-address.

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structures in the transition and at the steady state. Furthermore, the welfare gains of optimal differential capital taxation are as high as 0.4% of lifetime consumption for reasonable parameter values.

We study dynamic optimal taxes in an economy in which people are heterogeneous in terms of their skills, and the government uses capital and labor income taxes to provide redistribution (insurance). The benchmark model considers an environment with permanent skills. The main theoretical results are then generalized to an environment with stochastic skills. Our approach to optimal dynamic taxation follows the recent New Dynamic Public Finance literature in the sense that taxes are allowed to be arbitrary functions of people's past and current incomes.

The key feature of our environment is equipment-skill complementarity in the production technology. Following Gravelle (2011), capital assets are grouped into two categories: structure capital and equipment capital. There are two types of labor: skilled and unskilled. Following the empirical evidence for the U.S. economy provided by Krusell et al. (2000), we assume that the degree of complementarity between equipment capital and skilled labor is higher than the degree of complementarity between equipment capital and unskilled labor. Structure capital is neutral in terms of its complementarity with skilled and unskilled labor. More generally, Flug and Hercowitz (2000) provide evidence for equipment-skill complementarity for a large panel of countries.

Equipment-skill complementarity implies that skilled and unskilled labor are not perfect substitutes and that the skill premium – defined as the ratio of the skilled wage to the unskilled wage – is endogenous. In particular, a decrease in the stock of equipment capital decreases the skill premium, thereby creating an indirect transfer from the skilled agents to the unskilled ones. Therefore, depressing the level of equipment capital creates an extra channel of redistribution and/or insurance. In order to depress equipment capital accumulation, the government taxes returns to equipment capital at a higher rate than it taxes returns to structure capital. This implies the optimality of differential capital taxation.

We assess the quantitative importance of differential capital taxation using the model with permanent skills calibrated to the U.S. economy. In our benchmark calibration, the optimal equipment capital income tax is 27.6 percentage points higher than the tax on structure capital in the first period. The tax differential rises along the transition path to 39.6 percentage points at the steady state.

The skill premium is about 40% in the first period after the optimal tax reform, and rises over the transition to 48% in the new steady state. Thus, the 'optimal' skill premium in any period is significantly lower than 80%, the empirical estimate for the current U.S. economy. This suggests that the optimal tax system relies much more on indirect redistribution than the current U.S. tax system. In addition, the optimal skill premium is rising over the transition because the economy is growing, and hence, the level of equipment capital increases. This result is interesting as it suggests that, even if the government cares about equality, an increasing skill premium is optimal in a growing economy.

Next, we evaluate the welfare gains of optimal differential capital taxation. This is achieved by comparing welfare in the optimal tax system with welfare in a tax system, in which the government is unrestricted in its choice of labor income taxes, but the tax rates on both types of capital are restricted to be equal to the values in the U.S. tax code. The additional welfare gains of allowing for differential capital taxation are 0.19% in terms of lifetime consumption in the benchmark and can be as high as 0.40% within the set of reasonable parameter values.

This paper focuses on the redistribution and insurance provision role of differential capital taxation. There could be other reasons for differential taxation of capital. For instance, some authors have argued that investment in equipment capital might create positive externalities. Other things being equal, positive externalities would be a reason to tax equipment capital at a lower rate than structure capital. Auerbach et al. (1994) point out, however, that it is hard to support the existence of such positive externalities on empirical grounds. This paper abstracts from all other possible reasons for differential capital taxation in order to isolate its redistributive and insurance provision role.

Related literature. This paper relates to three distinct strands of literature. First, in their seminal paper Diamond and Mirrlees (1971) show that tax systems should maintain productive efficiency. In an environment with multiple capital types, this result implies that all capital should be taxed at the same rate. However, Auerbach (1979) and Feldstein (1990) show that it might be optimal to tax capital differentially if the government is exogenously restricted to a narrower set of fiscal instruments than in Diamond and Mirrlees (1971). Our paper is different in the sense that the optimality of differential capital taxation stems from redistribution and/or insurance motives.

Our paper follows the New Dynamic Public Finance (NDPF) tradition. This literature studies optimal capital and labor income taxation in dynamic settings in which agents' labor skills are allowed to change stochastically over time and the optimal tax system can be arbitrarily nonlinear in the history of capital and labor income.[3] No paper in this literature, however, has studied differential taxation of capital assets prior to the current paper. In addition, our paper contributes to the NDPF literature by adding to a set of recent papers that aim to provide practical policy recommendations by quantifying the theoretical implications of the NDPF literature, see e.g., Fukushima (2010), Huggett and Parra (2010), Farhi and Werning (2013), and Golosov et al. (2013).

This paper is also related to a set of theoretical studies on optimal static Mirrleesian taxation with endogenous wages. Stiglitz (1982) assumes that the labor supplies of agents with different skills are imperfect substitutes and shows that the agent with the highest income should be subsidized. Naito (1999) shows that the uniform commodity taxation result of

[3] For seminal contributions to NDPF, see Golosov et al. (2003), Kocherlakota (2005), and Albanesi and Sleet (2006). For an excellent review of this literature, see Kocherlakota (2010).