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## Fiscal policies, frictional labor market, and endogenous growth



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## ABSTRACT

This paper considers the spillover effects from public spending, and studies optimal fiscal policies in frictional labor markets. We obtain that the optimal shares of government spending in production and consumption are the same as those in a frictionless labor market under the Hosios condition. However, as higher capital accumulation increases the cost of job creation and maintenance, the optimal tax rate of capital income is positive. In addition, when the labor market is frictional, the marginal benefit of labor is larger than the marginal utility of leisure. Thus, consumption and labor should not be taxed uniformly any more. Our calibration suggests that all of the three tax rates should be positive. Moreover, in the situation in which the Hosios condition does not hold, the shares of public productive spending and public consumption both increase when the worker's bargaining power is greater than the elasticity of search in the matching function.

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## 1. Introduction

Public goods and their associated externalities provide a critical way through which government expenditure and taxation policies affect private resource allocation and social welfare. In discussing the connection between government spending and macroeconomic performance, most of the literature has divided public goods into two different types. The first type consists of those that directly improve productivity. As shown in an influential pioneering work of [Barro \(1990\)](#), and much of its subsequent literature including [Barro and Sala-I-Martin \(1992\)](#), [Agénor \(2011\)](#) and so on, public spending on infrastructure may promote economic growth. The growth-maximizing (welfare-maximizing) rates of taxation and public investment are generally positive. The second type includes those that are purely welfare-enhancing. Examples can be found in the survey by [Irmen and Kuehnel \(2009\)](#), [Turnovsky \(1996\)](#), [Klein et al. \(2008\)](#) and so forth. Such spending enhances household welfare and interacts with private consumption and leisure in the utility function.

Some studies use both public consumption and investment and analyze optimal fiscal policies, such as [Turnovsky \(2000\)](#); [2004](#), and [Agénor \(2008\)](#), etc. Among these articles, [Turnovsky \(2000\)](#) found the optimal share of government investment expenditure to equal its contribution in the production function, and the optimal share of government consumption expenditure to equate the marginal utility of public consumption with that of private consumption. If government expenditures are set optimally, capital should not be taxed. That is, consumption and labor should be taxed uniformly.

These existing papers which discuss public consumption or investment mostly do so in a setting of frictionless labor markets. However, the evidence indicates that the labor market is frictional. According to [Diamond \(1982\)](#), [Mortensen \(1982\)](#) and

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Pissarides (1984), there are information and institutional barriers to job search, recruiting, and vacancy creation in the labor market. An interesting question that arises concerns the robustness of the optimal public policies in an economy with labor market friction. We wonder if such search and recruiting frictions may distort the behavior of households and firms, so that the zero capital income tax and the negative labor income tax as suggested by Turnovsky (2000) may be too distortionary.

This paper constructs a one-sector endogenous growth model and discusses the optimal fiscal policies in frictional labor markets. If the economy has labor search and matching friction, there may be matching externalities. For example, when a firm posts a vacancy, it reduces the chances for other firms to fill their vacancies (a negative externality) but it also increases the probability of workers finding a match (a positive externality). Hosios (1990) showed that the two types of externalities cancel each other out if labor's share in the wage bargaining is precisely equal to its contribution to the formation of a match.<sup>1</sup> However, since there exist spillover effects in the production function in this paper, the Hosios condition may not be sufficient to reach an optimal allocation as in a frictionless labor market. Thus, we consider two situations, one in which the Hosios rule is met, and the other in which it is not met.

In this paper, we first investigate the case where the government spending does not have any spillover effect, and discuss how the frictional labor market and endogenous growth affect the optimal taxation. We obtain that the optimal tax rate of capital income is not zero even if the Hosios rule holds. This is because the capital accumulation is the key factor in improving the economic growth in a one-sector endogenous growth model. The capital taxes depend on the externality from a higher economy-wide average capital stock in the production function and the cost of job creation and maintenance under the Hosios condition. The result is different from that in Domeij (2005) in which the firms use the Neoclassical production function and the optimal capital tax is zero when the Hosios condition holds. Furthermore, as the marginal benefit of labor is not equal to the marginal utility of leisure in frictional labor markets, the optimal tax on labor income no longer exactly offsets the tax on consumption. Different from Turnovsky (2000) in which the optimal consumption tax is positive and the optimal labor tax is negative, we find that both tax rates of labor income and consumption could simultaneously be positive.

It is worth mentioning that Jones et al. (1993, 1997) and much of their subsequent literature investigated an optimal capital income tax in an endogenous growth model. Jones et al. (1993) examined the optimal taxation in three kinds of endogenous growth models which are a convex model, a Lucas-style technology with an elastic labor supply, and a one-sector endogenous growth model including government expenditures as a productive input in capital formation. In their third model, they obtained that the asymptotic tax rate on capital income is strictly positive if the government spending has direct positive effects on investment. This result is similar to that in Barro (1990). In addition, Jones et al. (1997) obtained non-zero taxes on capital income when there exist restrictions across tax rates, or when the capital stock enters the objective function, or when there are two types of labor. Moreover, in the overlapping generations framework, Ho and Wang (2007, 2015) obtained that the optimal tax rate of capital income is positive in an endogenous OLG growth model with information frictions in financing capital accumulation. In the benchmark model, we do not need to add any restriction on taxes or public spending, and do not need to rely on a special utility function or heterogeneous labor. We can have the result of the non-zero capital income tax. Furthermore, we can discuss the effects of search and recruiting frictions on optimal taxation.

Next, we extend our model and discuss the effects of public consumption and investment on the optimal fiscal policies. We find that even if the labor market is frictional, when labor's wage bargaining share equals its contribution in a match, the optimal shares of government spending in production and consumption are the same as in a frictionless labor market. Besides, if the Hosios rule does not hold, the shares of government productive spending and public consumption are higher than those in a frictionless labor market when the worker's bargaining power is larger than the elasticity of search in the matching function.

Intuitively, under these circumstances, workers obtain more wages than their relative contribution. This generates too much search, while firms reduce job vacancies due to the lower surplus from a successful match. The matching equilibrium is lower because of fewer vacancies. Thus, (i) the share of government productive spending needs to be raised in order to increase the added value of recruiting an extra worker for firms, and (ii) as less employment implies that households earn less income, the growth rate of the economy is also lower. In order to increase the household's long-run welfare, the share of government consumption expenditure has to be increased.

With regard to the optimal taxation, we find that even if the Hosios rule holds, the optimal tax rate of capital income is positive due to the result that the hiring cost is a function of capital accumulation and this setting is consistent with a perpetual growth setup. Moreover, we also obtain the non-equivalence of the consumption and labor taxes. Thus both tax rates of labor income and consumption could simultaneously be positive. The formal analysis is supplemented by quantitative results, and the numerical exercises support our theoretical inferences.

In recent papers that have studied optimal taxation in a model with labor market friction, Domeij (2005) has shown that zero capital taxation remains robust when the Hosios efficiency condition holds. In order to analyze the effect of frictional labor markets on the trade-off between consumption and leisure (employment and search), apart from levying taxes on factor income, we allow the government to levy taxes on consumption. In this way, we can more clearly understand the effect of labor market frictions on optimal taxation via analyzing the difference between the marginal benefit of labor and the marginal utility of leisure.

<sup>1</sup> In the search and bargaining framework, the firm chooses labor and capital without considering the implications for wages. Workers and firms bargain over marginal productivity, which is decreasing in workers so that firms have an incentive to hire more workers (see Stole and Zwiebel, 1996). Cahuc and Wasmer (2001) show that, with constant returns to scale, this may not matter. In this paper, we therefore assume that the production function for firms exhibits constant returns to scale.

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