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Macroeconomic effects of cost equivalent business fiscal incentives☆

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ABSTRACT

We investigate the macroeconomic impacts of three fiscal policy instruments that provide temporary business tax incentives: investment tax credit (ITC), wage subsidy, and capital income tax cuts. Using a DGSE model, we set all three policies such that their lifetime tax expenditure costs are identical. We then compare their returns in terms of boost to the economy, revenue recovered, and welfare gains. The ITC policy has the highest lifetime returns in terms of output and investment while the wage subsidy policy generates the highest lifetime returns in consumption and employment. We also find that the wage subsidy policy yield faster results but the ITC policy produces longer-lasting effects. Our dynamic scoring exercise shows that the ITC and wage subsidy policies recover close to 85% of the revenue loss. The capital income tax cut is the least performing policy. Overall, our results suggest that, when their dynamic impacts on the macroeconomy are accounted for, business fiscal incentives are welfare enhancing and partially self-financing.

1. Introduction

As part of the efforts to stabilize the U.S. economy during the Great Recession of 2007–2009, the U.S. Congress passed the Economic Stimulus Act of 2008 and the American Recovery and Reinvestment Act of 2009 (ARRA). These stimulus packages highlight the important role fiscal policies can play in stabilizing an economy, particularly in an environment where traditional monetary policies are ineffective due to the zero lower bound (Carrillo and Poilly, 2013; Christiano et al., 2011; Eggertsson, 2011; Mertens and Ravn, 2014).[1] As a result, a renewed interest in evaluating the effects of government spending is evident among researchers (see Barro and Redlick, 2011; Nakamura and Steinsson, 2014; Ramey and Zubairy, 2014).

Interestingly, much of the existing literature addresses the effectiveness of fiscal policies by focusing on government expenditure on goods and services, failing to account for policies designed to offer direct business incentives in the form of tax cuts. The ARRA, for example, included $286 billion in tax reduction, out of a total of $787 billion. A few recent studies contrast the effectiveness of government spending and tax cuts as economists and policymakers continue to debate their relative importance. Using historical data for 10 emerging Asian economies, Jha et al. (2014) find that tax cuts have greater countercyclical impacts on output than government spending. Mountford and Uhlig (2009) apply a vector autoregression approach to postwar U.S. data and find that deficit-financed tax cuts can generate up to 5 dollars of additional gross domestic product (GDP) for each dollar of revenue loss. In a Congressional Research Service report, Hungerford and Gravelle (2010) analyze recent fiscal proposals to use business tax incentives for spurring economic activity. They deplore the lack of studies that evaluate the impact of investment incentives on aggregate macroeconomic variables like employment.

In this paper, we use a dynamic stochastic general equilibrium (DSGE) model to examine and contrast the effects of alternative fiscal policies that provide direct incentives to businesses. We consider three policies: investment tax credits (ITC), wage subsidies, and capital income tax cuts. Although their end goal is similar, the transmission

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[1] The zero lower bound refers to a situation where traditional monetary policy instruments are ineffective due to short-term nominal interest rates being near zero (see Bernanke et al., 2004 for a discussion on the topic).

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channels differ. ITCs and capital income tax cuts are direct incentives to invest because they either reduce the cost of capital or improve its return. Higher capital in turn increases the productivity of labor. In the end, the economy generates more output. Similarly, a wage subsidy is a direct incentive to hire. It reduces the effective labor cost and induces the profit-maximizing firm to increase employment. Higher employment in turn increases the productivity of capital and the economy experiences higher capital accumulation and output.

Our work is close to that of Greenwood and Huffman (1991) who also use a real business cycle (RBC) framework to analyze the welfare impacts of similar policies. However, there are a few fundamental differences between the two studies. First, Greenwood and Huffman (1991) compare long-run effects of alternative fiscal policies that are permanent in nature, whereas we evaluate the effects of temporary fiscal incentives. Second, an important limitation of Greenwood and Huffman (1991)'s study is that they do not account for the macroeconomic effects during the transitional periods. Third, unlike Greenwood and Huffman (1991), we set our competing policies such that their costs to the taxpayers are identical. Hence, their macroeconomic impacts can be compared on equal footing. Finally, in addition to calculating the welfare effects, we use several other tools to analyze how the economy responds to each cost-equivalent policy. We compare the returns of each policy in terms of boost to the economy and we use a dynamic scoring approach to estimate the extent to which the proposed policies are self-financing.

The dynamic scoring method captures how additional revenues generated from economic growth help offset the cost of a given policy change. Static scoring methods have been widely criticized as they ignore general equilibrium effects. A dynamic scoring accounts for the revenue effects of a tax proposal using macroeconomic models in which tax changes can affect aggregate income and feedback to revenues through the tax base (Auerbach, 2005; Mankiw and Weinzierl, 2006). Using standard deterministic neoclassical growth models calibrated to U.S. data, Mankiw and Weinzierl (2006) report that permanent reductions in capital (labor) tax rates can expand the tax base enough to offset 53 (17) percent of the revenue loss. However, Mankiw and Weinzierl (2006) did not account for the transitional dynamics, as well as the possibility that financing schemes may distort economic behaviors. Leeper and Yang (2008) address these concerns and find that capital (labor) tax cut recovers 95 (47) percent of revenue loss when tax cuts are financed by lump-sum adjustments.[2] Using a perfect foresight model, Judd (1987) shows that an unexpected temporary increase in investment tax credit can be self-financing.

We use a combination of multiplier calculations, dynamic scoring, and welfare analysis to evaluate the three tax incentives. We find that wage subsidies have faster but shorter effects on output and employment while ITCs have slower but longer lasting impacts. Consumption tends to fall initially when an investment fiscal incentive is provided. The ITC policy has the highest lifetime returns in terms of output and investment while the wage subsidy policy generates the highest lifetime returns in terms of consumption and employment. For shorter horizons, the wage subsidy policy generates the highest returns for all the macroeconomic variables of interest but investment.

All three fiscal policies positively affect government revenue through their dynamic impacts on labor and capital income taxation. Our results suggest that much of the revenue losses are recovered, but none of the policies is fully self-financing. This result is in line with much of the dynamic scoring findings in the literature (Mankiw and Weinzierl, 2006; Leeper and Yang, 2008; Strulik and Trimborn, 2012). Specifically, we find that the ITC policy recovers 85% of the tax expenditure over the long run, closely followed by the wage subsidy policy with 83%. When we limit the evaluation period to 5 years, wage subsidy policy performs best with a recovery of revenue of 55%, compared to 25% for the ITC.

[2] See also Trabandt and Uhlig (2011) and Strulik and Trimborn (2012) for a dynamic estimation of Laffer curves.

Finally, we perform a welfare analysis of the impacts of the alternative policies. Following Greenwood and Huffman (1991), we construct a measure that quantifies welfare gains (or losses) in terms of the additional amount of consumption needed to keep the agent equally well off. As Greenwood and Huffman (1991), we find all three policies to be welfare improving. The wage subsidy policy has the highest welfare gain, followed by the ITC policy. The welfare gain of the wage subsidy is equivalent to an increase in consumption of 4.30% of steady-state output, compared to 2.99% for the ITC, and 0.31% for the capital income tax cut.

The remainder of the paper is organized as follows. We outline the structure of the model in Section 2. In Section 3, we discuss the functional forms and parameters used in the numerical simulations. We present and discuss the results in Section 4 and provide concluding remarks in Section 5.

2. The model

We build fiscal policy instruments into a standard closed-economy real business cycle model. The model economy features a representative household who derives utility from leisure and consumption and maximizes her discounted lifetime utility: $E_0\sum_{t=0}^{\infty}\beta^t U(C_t, L_t)$. Here, C_t is aggregate consumption and L_t is aggregate labor supply. The household receives labor income W_tL_t and income from capital S_tK_t, where W_t is the wage rate, S_t is the rental rate of capital, and K_t is aggregate capital. The government collects taxes on both factors of production and redistributes the proceeds to the household in the form of a lump-sum transfer T_t and, when applicable, an investment tax credit μ_tI_t, where μ_t is the rate of investment tax credit and I_t is investment. Denoting τ_L the tax rate on labor income and τ_K the tax rate on capital income, the overall budget constraint for the household is:

$$C_t + (1-\mu_t)I_t + \Phi(K_t - K_{t-1}) = (1-\tau_{Lt})W_tL_t + (1-\tau_{Kt})S_tK_{t-1} + T_t. \quad (1)$$

where $\Phi(.)$ is a convex capital adjustment cost function. Capital depreciates at the rate δ. The optimalilty conditions are:

$$U_C(C_t, L_t) = \lambda_t \quad (2)$$

$$U_L(C_t, L_t) = -\lambda_t(1-\tau_{Lt})W_t \quad (3)$$

$$\begin{aligned}&\lambda_t\left[(1-\mu_t) + \Phi'(K_t - K_{t-1})\right]\\&\quad = \beta E_t\lambda_{t+1}\left[(1-\mu_{t+1})(1-\delta) + \Phi'(K_{t+1} - K_t) + (1-\tau_{Kt+1})S_{t+1}\right]\end{aligned} \quad (4)$$

where λ_t is the Lagrange multiplier associated with her budget constraint.

Output is produced by the representative firm according to the following standard neoclassical production function in which the stochastic productivity variable is Z_t.

$$Y_t = Z_tF(K_{t-1}, L_t) \quad (5)$$

Total factor productivity follows the following AR(1) process:

$$\ln Z_t = \rho_Z \ln Z_{t-1} + \varepsilon_{Zt}; \quad \varepsilon_{Zt} \sim NIID(0, \sigma_Z^2) \quad (6)$$

The optimal demands for labor and capital are determined by their respective marginal products and real costs. Hence, the following two optimality conditions must hold:

$$W_t = Z_tF_L(K_{t-1}, L_t) \quad (7)$$

$$S_t = Z_tF_K(K_{t-1}, L_t) \quad (8)$$

The government has the following balanced-budget constraint:

$$T_t + \mu_tI_t = \tau_{Lt}W_tL_t + \tau_{Kt}S_tK_{t-1} \quad (9)$$