

The table of contents and introduction part of my master's thesis are extracted below, which are supposed to give to the reader an idea about the work. In case you are interested in the whole work, please contact me through the following e-mail address:

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Fiscal Policy in a Real Business Cycle Model

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Table of Contents

1 Introduction	3
2 The Existing Literature	7
3 The Model	11
3.1 Preferences	11
3.2 Technology	12
3.3 Resource Constraints	13
3.4 Public Finance Rules	14
3.5 Efficiency Conditions of the Economy	15
3.6 Policy Tools	16
3.7 Steady-State	17
4 Methodology	19
4.1 Log- linearization	19
4.2 Impulse-Response Analysis	20
4.3 Sensitivity Analysis	21
4.4 Second Moment Properties	21
5 Quantitative Analysis	22
5.1 Calibration	22
5.2 The Neoclassical Model and Stylized Facts	23
5.3 Experiments with Fiscal Policy	24
5.3.1 Model without productivity-augmenting government investment	24
5.3.2 Model with productivity-augmenting government investment	33
5.3.3 Model with taste shocks	35
6 Conclusion	38
References	42
Appendix	44
Tables	45
Figures	56

1 Introduction

This diploma thesis investigates, how the standard real business cycle model changes, when fiscal policy is added to it. In particular, the assumptions about the fiscal policy rules are changed in comparison to other studies in the area. The aim is to find out the quantitative changes, which come out by adding fiscal policy to the standard RBC model. The qualitative mechanisms behind the quantitative results are considered as well.

It is known that the standard RBC model has some deficiencies, although it is successful in explaining certain aspects of the real economic time series. The standard model, in particular, predicts the relative volatilities of output, consumption and investment correctly. The positive contemporaneous correlation of output with many other economic variables is generated, too. However, the model shows deficiencies especially regarding the labor market variables. The biggest failure seems to be the very high correlation of real wage with hours worked predicted, which contradicts the Dunlop-Tarshis observation. The observation states a low or negative correlation between these two variables. A second failure is the high correlation of real wage with output generated by the model. The data says that such a correlation is nonexistent. On the other hand, although this theoretical correlation is predicted wrongly, the relative volatility of real wage with respect to output is predicted to be low as in the real data. These properties of the labor market variables will be focused on throughout this paper.

In the standard RBC model, a technology shock affects directly the supply side of the economy. It means an increase for the labor demand and, through this channel, for the wages. As the upward sloping labor supply curve is not affected from such a shock and stays fixed, a technology shock means an increase in both the hours worked and the real wages. This is why the standard RBC model generates such high correlations between these two variables. One needs some extra shocks that move the aggregate demand in the model in order to capture the empirically observed low correlation. The mechanism is illustrated roughly in Figure (1). Panel (a) is the case, where there is only a technology shock. As it is seen, a technology shock shifts the labor demand only and this is the reason behind the high correlation of hours worked and real wages in the standard model. The panels (b) and (c) refer to the case, when one or more other shock(s) exist(s) in the system, (some of) which (is) are capable of shifting the labor supply. The existence of such shocks leads to a decrease in that correlation. The

correlation might even be negative under this structure, as it is empirically observed in some countries.

The high correlation between real wage and output comes from the specification of the production function. A Cobb-Douglas production function means proportional marginal and average products of labor¹. This brings a higher procyclicality of real wages and productivity, thus, also a higher correlation of real wage and output. A shock affecting the efficiency conditions of the representative agent directly may affect the labor supply decision without having a direct effect on the output. Such a mechanism may lead to a decrease in this correlation value then. However, one should be careful about it, as it may also serve to increase the relative volatility of hours worked, and thus of real wage in comparison to output, which could spoil a successful quantitative prediction of the standard RBC model.

This paper investigates, how adding fiscal policy to the standard RBC model in various ways changes its properties, in particular the ones that are mentioned above. A second focus is the relationship of the macroeconomic variables to the fiscal policy tools. The model that is studied below will take the model of Baxter and King (1993) as the starting point. They describe in particular the dynamics of the neoclassical model with different types of government expenditure structures. In the following, fiscal policy is added to the standard RBC model in many different ways. The aim is to see if the fiscal policy changes the quantitative performance of the RBC model in the direction of empirical data. Nevertheless it should be taken into account that an improvement in the quantitative performance may depend on a wrong mechanism. With that reason the mechanisms behind the quantitative results are also considered. The findings are compared to the corresponding empirical and theoretical studies in the literature, too. For all the experiments run, impulse-response analyses are made; the second moment properties are checked; and finally the interactions of the economic variables behind the results are evaluated.

Most of the experiments are made by changing the specifications of the policy tools. The government keeps the budget in balance in all of the experiments by changing the amount of the transfers accordingly. The policy maker has namely four tools: 1) Purchase of goods, 2) Productivity-augmenting investment, 3) Tax rates, 4) Transfers. Through the purchase of goods, it can affect the distribution of the resources in the economy, which are available for

¹ Labor gets its marginal product under competitive equilibrium, which is assumed in this study.

the private agents. Such an action generates negative wealth effects for the representative agent. By making investments, the government can affect the marginal products in the economy. The taxes in general have distortionary effects. Although they do not decrease the production possibilities, they change the incentives of the representative agent. Transfers assure that the government keeps its budget in balance. The existence of this variable in the system justifies that there is no government debt in the system. The Ricardian equivalence should hold, when the government has this policy tool in its hand despite the existence of taxes that are not constant through the time.

There are three alternatives for the motion of the policy variables in this paper. The first alternative is that the tax and spending policies of the government are dependent on the movements of the business cycle in the direction of the aim of the political authority. Alternatively, the policy variables may follow completely exogenous processes. The third alternative is a mixture of the first two.

King, Plosser and Rebelo (1988b) state that the tax rates and the government expenditures can be functions of some variables of the system. The governments may follow policies that fit to their aims. It can be of interest to examine what type of policy assumptions lead to a model that mimics the real world better. A theoretical model may perhaps in this way serve to understand the behavior of the government. This is tried below.

The experiments of this study where only fiscal policy is embedded to the standard RBC model have once again proved that only adding fiscal policy to the standard RBC model does not help to solve all the problems. Some quantitative improvements come at the cost of creating new puzzles. Other than fiscal policy, a taste variable is embedded to the utility function of the representative agent below, in order to see if this helps to correct some mistakes and leads to further quantitative improvements.

The most important findings of this study can be summarized as follows:

- 1) The inclusion of fiscal policy in the neoclassical model in the form below smoothes the responses of output and investment, whereas it makes the other system variables more volatile, to technology shocks;

- 2) Although the correlation of hours worked and real wage becomes closer to reality with fiscal policy, this comes at the cost of increasing the relative volatility of real wage in comparison to output;
- 3) The very low, almost no, correlation between government purchases and output can be reached by assuming an exogenous process for the government purchases, but not with the assumption that government purchases depend on the business cycle totally or partly; at least not under the current model specification;
- 4) The qualitative responses of output, real wage, capital stock and investment to a shock in government purchases are sensitive to the persistence of the shock;
- 5) The qualitative responses of output, labor, real wage, investment and return to a shock in tax rate are sensitive to the persistence of the shock;
- 6) Embedding productivity-augmenting government investment does not bring an improvement in terms of second moment properties in comparison to the model without productivity-augmenting government investment, regardless of whether government investment is assumed to follow an exogenous process or depend on the business cycle;
- 7) Adding a consumption taste shock to the utility function seems to help to improve quantitative results regarding the correlation of real wage with output and the correlation of hours worked with real wage;
- 8) When the policy tools follow exogenous processes, the technology turns out to be the biggest driving force behind the business cycles followed by tax rate, government purchases and government investment, respectively;
- 9) When the assumption is made that the fiscal policy responds to the business cycle, the RBC model is observed to generate more successful properties under the assumption of a business-cycle-smoothing fiscal policy rather than a tax-smoothing policy.

The paper is organized as follows. The next section summarizes and compares the empirical and theoretical findings in the literature that are relevant to this diploma thesis. Section 3 presents the model and its main properties. The methodology that is used throughout the paper is discussed in Section 4. Section 5 reports the quantitative and qualitative properties of different types of models used. Section 6 concludes.