The Unemployment Effects of Fiscal Policy in Netherlands

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ABSTRACT

This paper focuses on the effects of fiscal policy in Netherlands analyzed in a VAR context. Fiscal shocks are found to involve significant impacts on GDP, unemployment rate, consumption and investment. In this regard, Keynesian effects are observed. In addition, the results suggest that unemployment rises in response to a fiscal contraction whereas it falls following a fiscal expansion. When government spending increases output increases; when total net taxes increase output falls. A social security tax innovation also leads to a rise in unemployment rate. Moreover, the results indicate that the social security taxes is a more effective tool compared to total net taxes for policy-makers in Netherlands in terms of GDP and its private components.

Key Words: *Government Spending, Total Net Taxes, Social Security Taxes, Unemployment*

Jel Classification: *E6, H6, H3.*

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1. INTRODUCTION

The literature as regards to the impact of taxation, or in a broader sense, the impact of fiscal policy shocks on overall economy, which has been extensively discussed by both academics and policy-makers, goes back to 1980s even though it has been gaining more importance during the last decade. There are two main reasons that make this topic even more attractive nowadays: the lack of consensus in the literature and the unfolding of the financial crisis of 2007-08. The former will extensively be discussed in the literature review section. Therefore, we will concentrate on the latter.

It is clear from the macroeconomic indicators that one of the most important drawbacks of the 2007-08 crisis was the high and unsustainable unemployment rate. Overall, there were around 170 million unemployed across the world before the crisis took place according to the International Labor Organization (ILO). However, that number increased to 197.2 million within four years following the crisis. In addition, high youth unemployment rate became also one of the major concerns worldwide. There were almost 75 million young people unemployed in 2011, which was quite above its pre-crisis level of 71 million. Moreover, more young people were in the queue for entering labor markets worldwide.

In order to stimulate their economies, during and after the financial crisis of 2007-08, the U.S. and European governments announced fiscal stimulus packages. The main goal of these packages was to handle the existing job crisis in the relevant countries by that time. For instance, according to the European Commission, the executive arm of the 27-nation bloc, the total fiscal stimulus in the EU equals between 3.3 and 4 percent of its gross domestic product[2]. At the other extreme, the accompanying analysis to the American Recovery and Reinvestment Act (ARRA) estimated a package of $787 billion to create new jobs in the U.S. and this package was approved by the Congress in February 2009 (Romer and Bernstein, 2009).

The emphasis on labor markets was clear. However, the debate on fiscal policy in the literature has mainly and extensively focused on the size of the GDP and consumption multiplier in response to an increase in government spending. In other words, there is a substantial body of literature devoted to the effects of fiscal policy on key macroeconomic indicators using Structural Vector Autoregression (SVAR) models. However, the same attention is not given to the impacts of fiscal policy on labor market and its main indicators.

This paper seeks to contribute to the analysis of the dynamic effects of a temporary change in fiscal policy on main macroeconomic indicators

[2] http://www.reuters.com/article/2009/03/17/eu-summit-stimulus-idUSLH44404720090317.

including unemployment by applying a Vector Autoregression method to Netherlands data. To this end, a 4-variable VAR model, which involves total government spending, total net taxes, GDP, and unemployment, is used as a benchmark. In a further step, the responses of these variables with respect to a disaggregated fiscal shock -namely a social security tax shock - are examined.

Netherlands data is employed in this study, as Netherlands is one of the most developed countries of the European Union, and during the crisis, it suffered from high unemployment rates and as a response, announced a fiscal stimulus package to fight against that drawback. The unemployment rate was around 3 per cent in Netherlands before the 2007-2008 crisis took place. However, right after the impacts of crisis had been felt, that rate increased to 3.7 per cent. In order to cope with the high unemployment rates, as of December 2008, the Dutch government passed a 6 billion Euro plan[3] (around 1 per cent of its GDP at that time), which includes a specific program to help find work for the unemployed.

With its methodology and specification, this study is the first attempt in the literature that concentrates solely on the impacts of fiscal policy on macroeconomic aggregates, particularly on unemployment in Netherlands. The results suggest that unemployment rises in response to a fiscal contraction whereas it falls following a fiscal expansion. When government spending increases output increases; when total net taxes increase output falls. A social security tax innovation also leads to a rise in unemployment rate. The results also indicate that the social security taxes is a more effective tool compared to total net taxes for policy-makers in Netherlands in terms of GDP and its private components. Furthermore, the analysis also demonstrates that Netherlands economy has the characteristics of Keynesian theory in the sense that increases in spending and taxes have opposite impacts on investment.

The remainder of the paper is organized as follows. The next section reviews the relevant literature. Section III focuses on the methodology and specification of the VAR model. Section IV describes the data. Section V investigates the impacts of the shocks and evaluates the results from the theoretical perspective. Section VI analyzes the robustness of the results and section VII concludes.

2. LITERATURE REVIEW

A common approach in both empirical and theoretical studies on fiscal policy shocks is to evaluate the response of macroeconomic aggregates to exogenous

[3] http://voxeu.org/article/european-recovery-plans-sound-principles-not-enough

changes in the fiscal policy variables. Both the empirical and theoretical studies, unfortunately, do not provide a common picture. For instance, following a positive government spending shock, New Keynesian theory tends to predict an increase in output, real wages and interest rate and a decrease in consumption and private investment. Yet in RBC models, the expansionary fiscal policy will lead to a decrease in real wages and an increase in private investment.

In this regard, Alesina, Ardagna, Perotti and Schiantarelli (2002) investigated the effects of a change in fiscal policy on private investment using a panel of OECD countries. Their finding is that increases in taxes have a negative impact on output is parallel to the findings of Blanchard and Perotti (2002). In addition, the latter concludes that private consumption increases following an increase in tax rates. Both of these studies demonstrate that any increase in taxes will reduce private investment. In addition, Perotti (2004) points out that the impact of any change in tax policy on GDP and its components becomes weaker over time. More recently, by employing a new database, Burriel et al (2010) analyze the effect of fiscal policy for the U.S. economy and Euro area as a whole. They find that GDP and inflation increase in response to government spending shocks even though the output multipliers are very similar and steadily increasing after 2000, possibly due to the "global saving glut", in both areas.

Using a five-variable VAR that involves government direct expenditure, net revenue, GDP, the price level, and the interest rate, Biau and Girard (2005) assessed the impacts of an increase in government spending in France, and found a positive reaction of private consumption. Investigating the effects of fiscal policy in Australia, Canada, Germany and the UK, Perotti (2004) on the other hand points out that the impact of any change in tax policy on GDP and its components evaporates over time. Afonso and Sousa (2009) used a Bayesian Structural Vector Autoregressive approach on a recursive identification scheme for the US, the UK, Germany and Italy. Their results indicated that government-spending shocks have a small impact on GDP. Envisaging the following three scenarios: a deficit-financed spending increase, a balanced budget spending increase, and a deficit-financed tax cut, Mountford and Uhlig (2008) try to distinguish the impacts of fiscal policy shocks between 1955 and 2000. Their main finding is that among the three scenarios the deficit financed tax-cut is the most efficient method in helping raise the GDP.

The studies regarding the impact of fiscal policy is, of course, not limited to the ones that are considering their impact solely on GDP and its components. For instance, Giuliodori and Beetsma (2010) studied the effects of domestic fiscal shocks on foreign exports in the European Union countries. They

indicated the need for closer fiscal policy coordination at the EU level since the trade spillovers are non-negligible. Similarly, Corsetti and Muller (2006) assessed the external impact of shocks to government spending and public deficits in the US, Australia, Canada and the UK. Their results indicated that relatively closed economies with less persistent shocks are less exposed to "twin deficits" phenomena.

However, much less attention has been devoted to the impacts of fiscal policy on labor market and its main indicators. There are only a few studies concentrated on this issue. For instance, in order to explore the impact of policies and institutions on unemployment in the past decades, Bassani and Duval (2006) estimated reduced-form unemployment equations using cross-country/time series data for 21 OECD countries during 1982-2003. They find that higher unemployment taxes raise unemployment. For the United States, studies such as Fatas and Mihov (2001) and Burnside et al. (2004) point out the positive impacts of government spending shocks on employment. Similarly, Monacelli et al. (2010) estimate a VAR model to investigate the effects of fiscal policy on labor market variables in the United States. According to the study, an increase in government spending of 1 per cent of GDP generates output and unemployment multipliers around 1.3 and 0.6, respectively. Such an outcome simply indicates that each percentage point increase in GDP produces an increase in employment of about 1.2 million jobs. In addition, hours and employment also rise significantly in response to a government spending shock.

3. METHODOLOGY

The reduced-form VAR specification can be written as

$$Z_t = A(L, q)Z_{t-1} + U_t \quad (1)$$

where Z_t is a N x 1 vector of endogenous variables, $A(L, q)$ is a N x N matrix lag polynomial, and U_t is a N x 1 vector of reduced-form innovations which are assumed to be independently and identically distributed with covariance matrix equal to the $\sum_U = E(U_t U_t')$. Following the leading studies in the literature, the following relationship between the reduced-form residuals U_t and V_t is assumed:

$$AU_t = BV_t \quad (2)$$

in which the shocks are assumed to be independently and identically distributed with covariance matrix equal to the identity one. Or, to put it differently, the structural shocks are assumed to be orthogonal to study the

impact of an isolated shock. By multiplying the first equation with A, the following structural form of the VAR can be obtained:

$$AY_t = AC(L)Z_{t-1} + AU_t = AC(L)Z_{t-1} + BV_t \tag{3}$$

Once this equation is solved for Z_t, it will yield the following structural moving-average representation

$$Z_t = [I - C(L)L]^{-1}A^{-1}B\ V_t \tag{4}$$

There are several strategies in the literature to identify a fiscal policy shock. The first approach is the recursive formulation also known as Cholesky decomposition proposed by Sims (1980). According to this approach, the current shock to the first variable ordered in the system precedes all other contemporaneous shocks, the second variable responds to the first variable and its own shock, and the shock to the third variable is affected by contemporaneous shocks to all the rest and so on. Yet, the most important drawback of this strategy is the importance of ordering of the variables. In other words, the ordering of the variables plays a crucial role in determining the direction of the causal relationship. Since there is no theoretical guide for ordering the variables, the assumptions behind any ordering will be strong and nontrivial and therefore, this approach will not provide consistent estimates of the structural shocks.

The second approach is developed by Uhlig (2005) and called the sign restriction method, which requires restrictions on the sign of the impulse responses of the fiscal variables. However, in this context, prior information on the qualitative responses of the variables is of a limited use given the various theoretical predictions. In addition, the signs of the effects *per se* is interested in general (Hebous, 2010).

The third approach is the dummy approach. Even though most of the studies using this method rely on single-equation techniques, there are some other studies applying this identification in a VAR setup. However, the main weakness of this approach is that the dynamics of all variables in the system is assumed to be the same in each episode. In addition, other fiscal shocks of different implications are likely to occur in line with the identified episode.

The fourth approach is the structural identification method proposed by Blanchard and Perotti (2002), which is being accepted as the seminal paper for fiscal policy structural vector autoregression approaches. According to this method, some elements of the matrix A in equation (2) can be obtained by using information on elasticities of government spending and taxes with respect to output. The elasticities can either be computed or taken exogenously. There are two main assumptions for this method. First, the

relative ordering of the fiscal variables needs to be identified. In other words, it is required to identify whether the government spending decisions or tax decisions are deemed to come first. Second, it is assumed that government spending does not react with a certain period to shocks to the economy. That is simply why the quarterly data is preferred in this method as it is not possible to learn about a GDP shock, pass the measures through legislature and implement them within a quarter. In this paper, the identification will be built upon this method and it is assumed that government spending decisions come first. Thus, the 5x5 matrix system takes the following form:

$$\begin{bmatrix} 1 & 0 & -\alpha_y^g & -\alpha_{ue}^g \\ 0 & 1 & -\alpha_y^T & -\alpha_{ue}^T \\ -\gamma_g^y & -\gamma_T^y & 1 & 0 \\ -\gamma_g^{ue} & -\gamma_T^{ue} & -\gamma_y^{ue} & 1 \end{bmatrix} \begin{bmatrix} u_t^g \\ u_t^T \\ u_t^y \\ u_t^p \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ \beta_g^T & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} v_t^g \\ v_t^T \\ v_t^y \\ v_t^{ue} \end{bmatrix}$$

where v_i^j's represents the structural shocks, u_i^j's stands for the reduced form residuals. The coefficients α_i^j measures the automatic response of fiscal variable i to the macroeconomic variable j. Similarly, the coefficients β_i^j capture the random discretionary fiscal policy shocks to fiscal policies.

3.1 The Specification

Equation 1 is estimated by ordinary least squares (OLS) method and the choice of the number of lags is made according to the Akaike, Schwarz and Hannan-Quinn information criteria and the final prediction error. Here, three lags is chosen. However, the model is also estimated with the alternative lags as a robustness check. The results are insensitive to this exercise. Furthermore, according the chosen lag, the augmented Dickey–Fuller test for the presence of unit roots is carried out. The null-hypothesis of a unit root at all common significance levels is rejected. In other words, the results indicate that all the variables are stationary as shown in Table 1. The VAR specification described above is estimated so as to obtain the responses of macroeconomic aggregates to various fiscal policy instruments.

Table 1. Augmented Dickey-Fuller Test For Unit Root

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Mac Kinnon Approximate p-value	Number of Obs
Log GDP	-3.239	-3.481	-2.884	-2.574	0.0178	187
Log Consumption	-3.628	-3.481	-2.884	-2.574	0.0052	187
Log Investment*	-3.176	-4.011	-3.438	-3.138	0.0893	187
Log Government Spending	-3.795	-3.481	-2.884	-2.574	0.0030	187
Log Total Tax Revenue	-2.979	-3.481	-2.884	-2.574	0.0369	187
Log Social Security Tax Revenue**	-1.318	-2.351	-1.655	-1.287	0.0947	154
Log Unemployment Rate**	-2.487	-2.347	-1.653	-1.286	0.0069	188

*indicates that the process under the null hypothesis is a random walk, perhaps with drift.
** indicates that the process under the null hypothesis is a random walk with non-zero drift.

Against this background, the baseline VAR includes four variables: government expenditures (g_t), tax revenue (T_T), the GDP (y_t), the unemployment rate (ue_t). Next, a number of other specifications where GDP is substituted, in turn, by its private components (consumption and investment) are also estimated. In a further step, the responses of macroeconomic aggregates to innovations in social security tax will be estimated by replacing total net taxes with the social security contributions.

Table 2. Exogenous Elasticities

	Real GDP	Unemployment Rate	Private Investment	Consumption
Total Net Taxes	0.9	0.27	0.55	0.35
Government Spending	0	0	0	0
Social Security Taxes	1.1	0.6	0.65	0.45

Source: (Perotti 2007, Monacelli and Perotti 2010, Van den Noord, 2000)

Table 2 provides an overview of the quarterly elasticities used in this study. The elasticity of tax to GDP is constructed from the data provided by OECD, following the leading studies in the literature i.e. Perotti (2007) and Monacelli and Perotti (2010). In this context, it is assumed that the contemporaneous elasticity of government spending with respect to GDP is zero. Such an assumption is also standard in the literature for most of the studies including but not limited to Blanchard and Perotti (2002), De Castro and De Cos (2008),

Burriel et al. (2010). Furthermore, the contemporaneous elasticity of government spending with respect to unemployment rate is also set to zero following the leading studies the literature. Finally, the elasticity of fiscal variables with respect to real private consumption and investment are equal to the elasticities with respect to GDP component in the sum of both. All other elasticities are obtained from Van den Noord (2000).

4. DATA

The availability of the quarterly fiscal variables, particularly for the net tax components, is a binding constraint, for the analysis of fiscal policy with VAR models. The sample for the baseline model, therefore, covers the period 1960:1-2007:3. The baseline VAR also includes quarterly data on government spending (g_t), net taxes (T_t) and GDP (y_t) all in real terms; the unemployment rate. T_t is defined as public revenues net of transfers, whereas g_t includes both public consumption and public investment.

Table 3 documents the summary statistics for the variables used in the empirical analysis. The data is obtained from the OECD Economic Outlook database. All the variables are seasonally adjusted by the original sources and log-transformed except the unemployment rate, which enters in levels. Following the leading studies in the literature, in all cases, the GDP deflator is employed in order to obtain the corresponding real values.

Table 3. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
Log GDP	191	5.29	0.39	4.47	5.87
Log Consumption	191	4.63	0.37	3.79	5.12
Log Investment	191	3.66	0.29	2.93	4.20
Log Government Spending	191	3.95	0.43	2.91	4.62
Log Total Tax Revenue	191	4.69	0.28	3.99	5.09
Log Social Security Tax Revenue	155	3.18	0.36	2.48	3.81
Unemployment Rate (per cent)	191	4.14	2.70	0.5	10.9

Source: (OECD Economic Outlook)

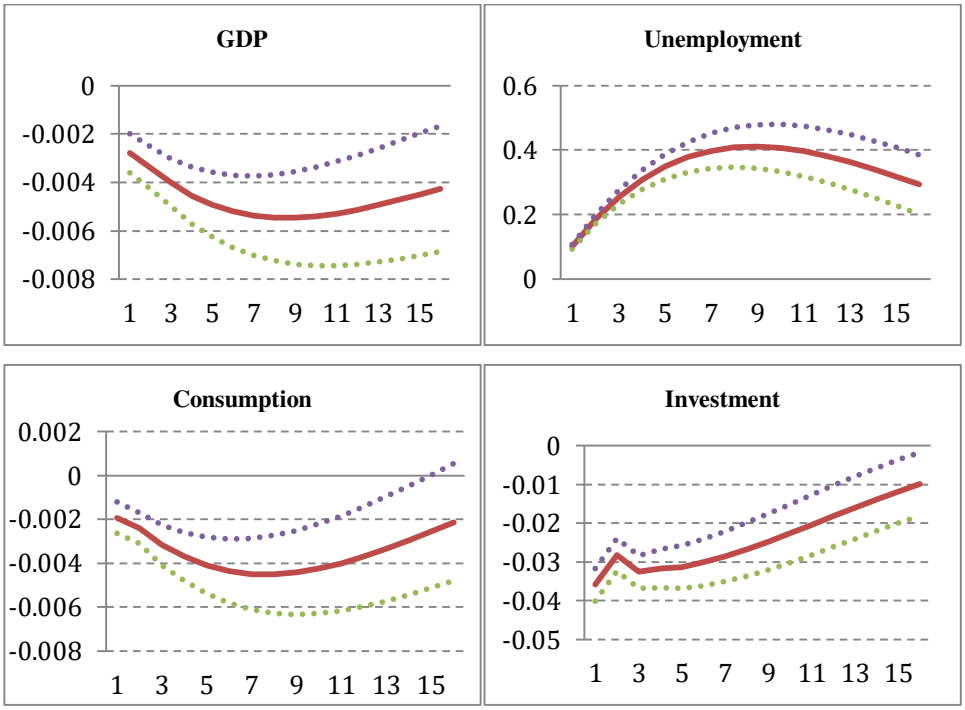
5. EMPIRICAL RESULTS

The effects of various types of fiscal policy shocks are computed on the basis of the estimated SVAR model. The figures depict the results displaying the impulse responses to a 1 per cent exogenous increase in the corresponding fiscal variable. In all cases, impulse responses are reported for 15 quarters and

the 68 per cent confidence bands, corresponding to the one standard error deviation of the responses, have been obtained by bootstrapping with 500 replications.

Figure 1 depicts the impulse responses of the GDP, unemployment rate, consumption and investment in response to an increase in total net taxes. It is clear from the figure that there is a persistent decline in GDP along with an increase in unemployment rate. Consumption and investment are crowded out by taxation in Netherlands.

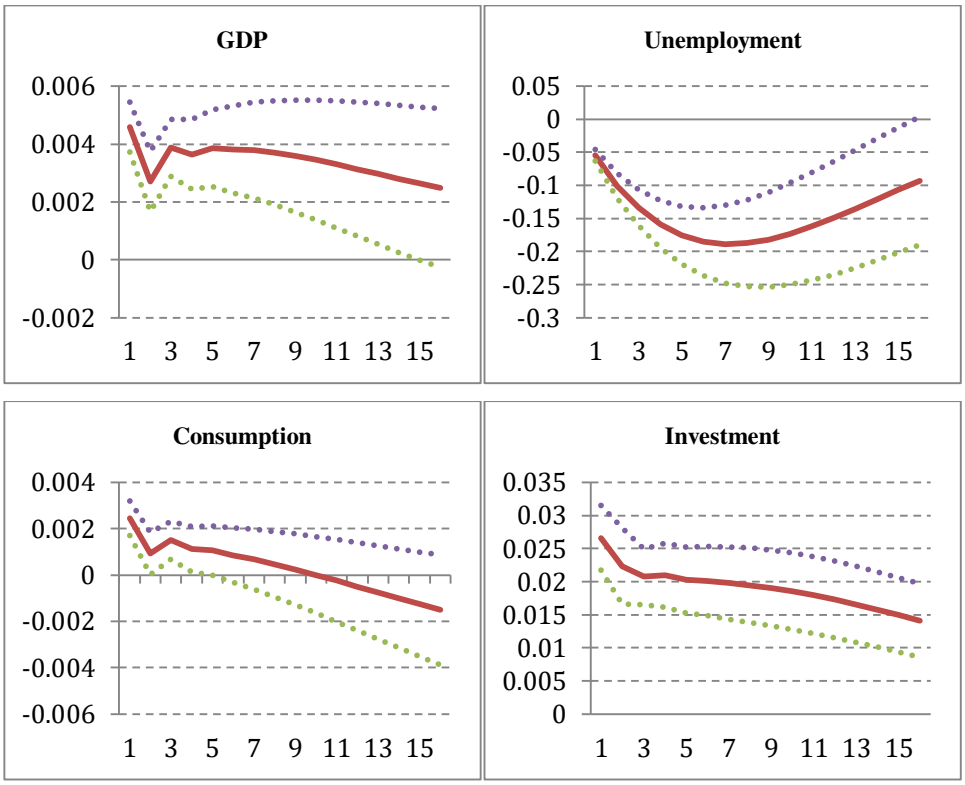
Figure 1. Effects of Total Net Tax Innovations in Netherlands



Notes: Dotted lines indicate the 68 per cent confidence interval.

Figure 2 shows the responses of the aforementioned variables in response to an increase in government spending. As opposed to the fiscal contraction, an increase in government spending yields a boost in output. GDP increases on impact and persists almost during the entire period under consideration. On the other hand, unemployment rate falls. Investment and consumption are also crowded in. Notably, the response of consumption is statistically significant for the first six quarters whereas the impact of fiscal expansion on investment is more sizable and persistent.

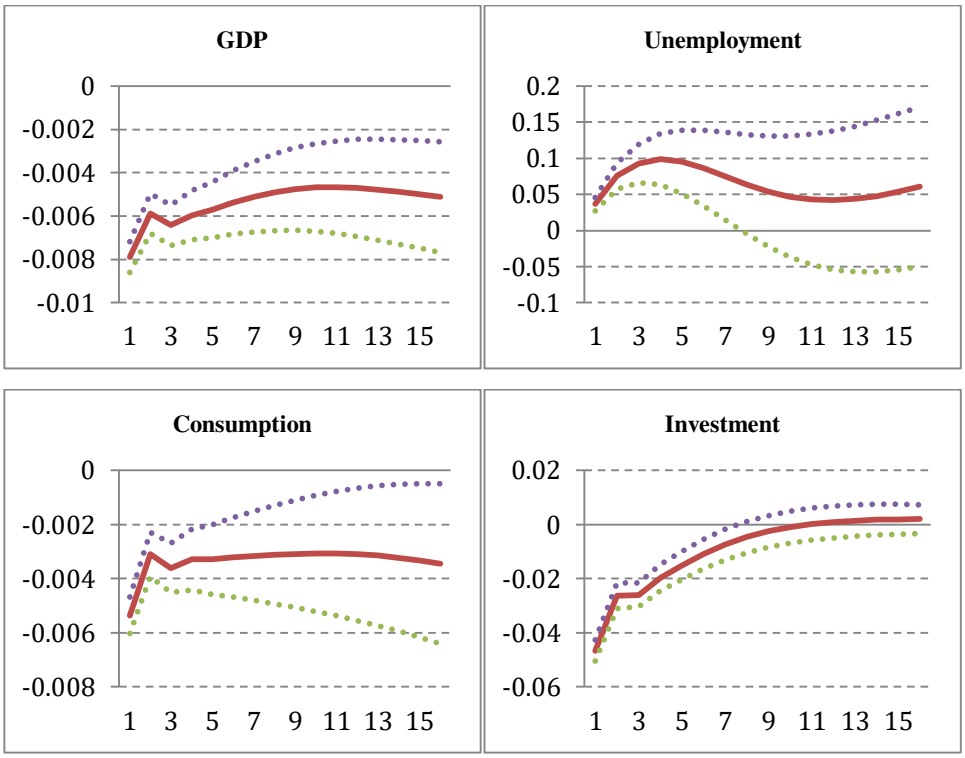
Figure 2. Effects of Government Spending Innovations in Netherlands



Notes: Dotted lines indicate the 68 per cent confidence interval.

Figure 3 presents the effects of a shock to social security taxes. Similar to an increase in total net taxes, a shock to social security contributions leads to a decline in output, consumption and investment and an increase in the overall unemployment rate. Here, it should be note that the decline in the variables is larger, in other words, the same amount of social security tax innovation causes a larger impact on the economy compared to the same amount of total net tax innovation. Or, to put it differently, the social security tax is a more effective tool compared to total net taxes for policy-makers in Netherlands in terms of GDP and its private components.

Figure 3. Effects of Social Security Tax Innovations in Netherlands



Notes: Dotted lines indicate the 68 per cent confidence interval.

5.1 What Do the Results Tell Us about Macro Theories?

From a theoretical point of view, the impacts of discretionary fiscal policy on the economy hinge on a number of key assumptions. In examining the transmission mechanism of fiscal policy, the presence or absence of forward-looking behavior plays a crucial role. On the one hand, if agents do not look forward, expected future changes do not have any effect on current-period decisions. Agents with rational expectations, on the other hand, do look forward in anticipation of future changes in key macroeconomic variables.

In the standard Keynesian approach, an increase in spending may yield either an increase or a decrease in investment depending on the relative strength of the effects of the increase in output and the increase in the interest rate; but, in either case, increases in spending and taxes have opposite effects on investment as mentioned in Blanchard and Perotti (2002). So, when Figure 1 and Figure 2 are examined, one can claim that our results are in line with the

Keynesian approach. Moreover, the same is true for consumption which is crowded out by taxation and crowded in by government spending.

In line with the Keynesian model and RBC predictions, the modified Dynamic Stochastic General Equilibrium models, in other words the Neo-Keynesian models, predict the following: social security tax innovations will lead to a decrease in tax-payer's after tax reward for each extra hour worked, lowering the cost of leisure. Thus, the individuals will be willing to work less in response to lower reward. This is the substitution effect (SE). On the other hand, a decrease in the real wage will reduce household lifetime earnings and, thus, human wealth. So, they will not be able to afford additional leisure and, as a result, will supply more labor. This is the income effect (IE). The relative magnitude of the two effects depends on the circumstances such as the elasticities of labor supply and demand. Hence, the hours worked may increase, decrease or remain the same after the tax innovation. Figure 3 shows us that the substitution effect dominates the income effect and therefore the unemployment rises.

6. ROBUSTNESS CHECKS

Several robustness checks were performed to the benchmark VAR specification. First, the sensitivity of the results to different values of the output elasticity of tax instruments is evaluated. The benchmark elasticities are replaced with their -/+ 10 per cent bandwidth values to see whether there is a significant change in impulse responses. Here, I do not go beyond 10 per cent bandwidth, as Cohen and Folette (1999) indicate that the elasticity might only change slightly over years. The results obtained with this alternative elasticities are very close to those of the benchmark model.

Following Perotti (2004), the sensitivity of the results is also reevaluated with different values of automatic stabilizer multipliers. For this purpose, the price elasticity of government spending is set to -0.5. The results are, again, insensitive to this exercise except a slight change on point estimates of the impulse responses.

Finally, other plausible patterns of contemporaneous ordering have been imposed because there is no basis for choosing one orthogonalization over the other as indicated by Perotti (2004). In this regard, government spending is ordered first. The results, under the assumption that government-spending decisions are deemed to be first, are very similar to those of the benchmark model. The differences are minimal in the sense that there was a trivial change on point estimates of the impulse responses.

7. CONCLUSION

The main target of this paper was to characterize the dynamic effects of total net tax, government spending and social security tax shocks on GDP, unemployment, consumption and investment in Netherlands using a structural Vector Autoregression approach with the Blanchard and Perotti (2002) identification scheme.

The results suggest that suggest that unemployment rises in response to a fiscal contraction whereas it falls following a fiscal expansion. When government spending increases output increases; when total net taxes increase output falls. A social security tax innovation also leads to a rise in unemployment rate. The results also indicate that the social security taxes is a more effective tool compared to total net taxes for policy-makers in Netherlands in terms of GDP and its private components. Furthermore, the analysis demonstrates that Netherlands economy has the characteristics of Keynesian theory in the sense that increases in spending and taxes have opposite impacts on investment.

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