5. HETEROGENEITY OF HOUSEHOLDS AND THE EFFECTS OF FISCAL POLICY IN THE CEE COUNTRIES [1]

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Abstract

We analyse the effects of fiscal policy in the non-EMU Central and Eastern European counties. The analysis is based on the new Keynesian model, which takes into account both optimizing Ricardian households and non-Ricardian households with liquidity constraints. Results of the study indicate that the share of non-Ricardian households has significant impact on fiscal multipliers. The government spending multiplier reaches almost 3 in the country with highest share of non-Ricardian households, whereas in the country with the lowest share of non-Ricardian households is lower than one. Also, the effects of government spending shocks on consumption are very sensitive to the share of households with liquidity constraints.

Keywords: fiscal multiplier, government spending, heterogeneity of households, non-Ricardian households, CEE countries

JEL Classification: E62

I. Introduction

The aim of this article is to estimate and compare the effects of fiscal policy in non-EMU Central and Eastern European countries, taking into account different shares of non-Ricardian households in these countries. As Galí, López-Salido and Vallés (2007) indicate the estimates of fiscal multipliers taking into account heterogeneity of households enable more precise assessment of effectiveness of fiscal policy. The assessment of fiscal multipliers is of increasing importance in the context of the future accession of CEE countries with derogation to Euro Area, because in the EMU the fiscal policy is the main macroeconomic instrument to cope with asymmetric shocks. However, there is a lack of similar studies for a group of Central and Eastern European countries with derogation.

What is more, conclusions from previous empirical research for the Euro Area cannot be easily adopted for the CEE countries, because the share of non-Ricardian

[1] *Research financed by National Science Centre, Poland (within research project DEC-2014/15/B/HS4/01996).*

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households with liquidity constraint is much higher in the non-EMU CEE countries than in the Euro Area. The credit market in the analysed countries in comparison with most countries of the Euro Area is relatively underdeveloped, which translates into a larger share of households with no access to the credit market. Moreover, the average income in the CEE countries with derogation is much lower than the average income in the Euro Area, what, as indicated by Mankiw (2000), generates a higher share of non-Ricardian households.

The analysis is based on the new Keynesian DSGE model. We extend the model of Galí, López-Salido and Vallés (2007) with fiscal rule, which takes into account the impact of GDP on the stance of fiscal policy. This relationship has been especially important since Great Recession which started in 2008, because big anti-cyclical government spending packages have become the standard behaviour of fiscal policy. Moreover, contrary to Gali, López-Salido and Vallés (2007), the estimates on the share of non-Ricardian households are based on microeconomic data concerning households' behaviour that is on Eurostat data on total population which is unable to face unexpected financial expenses.

This article is organized as follows. In the next section the literature review is presented. Then, we show the assumptions of the new Keynesian model with heterogeneous households. In the next section, we describe the parameters of the model which is followed by the presentation of the empirical results of the study. The concluding remarks and the scope for further research are presented in the last section.

II. Literature Review

In the standard new Keynesian model it is assumed that households are homogeneous and make consumption decisions based on the inter-temporal optimization. This assumption means that households take into account permanent income, as indicated in seminar papers of Brumberg and Modigliani (1954) and Friedman (1957). Permanent income hypothesis is very interesting from theoretical point of view; however, it was verified empirically that households do not base their consumption path on the level of permanent income. Empirical studies indicate that the current income has a significant impact on current consumption of households. Flavin (1981) shows that impact of current income on consumption is much stronger than permanent income hypothesis predicts. Moreover, consumption depends on current income more than predicted by overlapping-generations model (see among others Hall, 1978). Campbell and Mankiw (1989) found that about half of households make decisions not based on permanent income but on rule-of-thumb rules. Also, later studies show that current income has a significant impact on consumption (see for example Deaton, 1992; Johnson, Parker and Souleles, 2005).

Households that make decisions based on permanent income and behave according to the inter-temporal budget constraint are called Ricardian households. Non-optimizing households, using rule-of-thumb rules based on current income are called non-Ricardians. Possible interpretations for the non-optimizing behaviour of non-Ricardian households are: liquidity constraints, myopia, fear of saving or ignorance of trading opportunities (see Stiglitz and Weiss, 1981; Galí, López-Salido and Vallés, 2004; Coenen and Straub, 2005; Andersson, 2010). For example, Stiglitz and Weiss (1981)

point out that liquidity constraint may happen when interest rates are lower than interest rates clearing the market. Banks set interest rates which do not clear the market because it increases the ratio of safety loans (lower interest rates make safe investment projects with lower rate of return available). Lower interest rate results in credit rationing and liquidity constraint.

The standard new Keynesian model with homogenous optimizing households predicts a negative response of consumption to government spending. However, the empirical analyses show a positive effect of government spending on consumption (see among others Fatas and Mihov, 2001; Perotti, 2002; Mountford and Uhlig, 2009). This is one of the main reasons for which Mankiw (2000) indicates that new Keynesian model should take into account heterogeneity of households - the fact that some households act in forward-looking manner whereas others follow a rule-of-thumb behaviour. According to Mankiw, such heterogeneity has both micro and macroeconomic foundations. He points out that rule-of-thumb behaviour is typical for low income households, which do not save and are not able to smooth consumption (see Coenen and Straub, 2005). It means that in relatively low-income countries taking into account rule-of-thumb households in macroeconomic policy analysis is of particular importance.

First models focused on consequences of rule-of-thumb behaviour for monetary policy (see Gali, 2004).[3] Coenen and Straub (2005) extended the new Keynesian model with Ricardian and non-Ricardian households with fiscal policy. They conducted their analysis for the Euro Area and extend Smest and Wouters (2003) with fiscal policy rule and heterogeneity of households. Coenen and Staub (2005) obtained small ratio of non-Ricardian households in the Euro Area and, consequently, negative impact of government spending on consumption. The possible reason for low share of rule-of-thumb households in the Euro Area is the low level of financial market participation costs (see Fatas and Mihov 2001; Perotti, 2002). Also, more recent analysis concerning the effects of fiscal policy show that the share rule-of-thumb households in high-income countries is relatively low, especially during expansions (see, for example, Morita, 2015). However, the impact of rule-of-thumb households on the effects of fiscal policy is not thoroughly investigated in lower-income countries, in which the share of non-Ricardians is usually higher.

III. The Model

There is a continuum of household indexed by $j \in <0,1>$. We assume that are two fractions of households. One group of households (Ricardian households) have an access to capital markets and is optimizing consumption according to Ricardian equivalence. The second group of households (non-Ricardians) does not own any assets. Ricardian households are able to smooth consumption. Non-Ricardian households behave according to rule-of-thumb rule that is to consume their current income in each period.

[3] *Recent, more sophisticated models assuming various kinds of rule of-thumb households also usually focus on monetary policy (see among others Di Bartolomeo, Di Pietro & Giannini, 2016; Lengnick & Wohltmann, 2016; or Ascari, Colciago & Rossi, 2017).*

Ricardian households take into account not only the current utility, but also future discounted utility. We assume that households with access to the credit market face the following budget constraint:

$$U^R = E_t\left(\sum_{t=0}^{\infty}\beta^t\left(\ln C_t^R - \frac{\left(N_t^R\right)^{1+\varphi}}{1+\varphi}\right)\right), \quad (1)$$

where: C_t^R and N_t^R is consumption and labour supply of Ricardian households, respectively, $\beta \in (0,1)$, $\varphi \geq 0$,

In case of Ricardian households the budget constraint becomes:

$$P_t\ (C_t^R + I_t^R) + \frac{B_{t+1}^R}{(1+r_t^n)} + P_t\ T_t^R = W_t\ P_t\ N_t^R + (1+r_t^k)P_t^R K_t^R + B_t^R + D_t^R, \quad (2)$$

where: I_t^R, K_t^R and B_t^R is investments, capital and bonds of Ricardian households, respectively, r_t^k and r_t is return on capital and bonds, respectively, D_t^R - dividends paid to firms owned by Ricardian households, T_t^R – lump sum tax paid by Ricardian households, W_t - wages, P_t - price.

Capital accumulation is described by the following equation:

$$K_{t+1}^R = (1-\delta)K_t^R + f\left(\frac{I_t^R}{K_t^R}\right)K_t^R, \quad (3)$$

where: $f' > 0$, $f'' < 0$, $f(\delta) = \delta$, $f'(\delta) = 1$.

Thus, we obtain the following conditions of discounted utility maximization:

$$E_t\left(\beta\frac{C_t^R}{C_{t+1}^R}\right) = \frac{1}{1+r_t}, \quad (4)$$

$$E_t\left(\beta\frac{C_t^R}{C_{t+1}^R}\left(1 + r_{t+1}^k + Q_{T,t+1}\left(1 - \delta + f\left(\frac{I_{t+1}^R}{K_{t+1}^R}\right) - \frac{I_{t+1}^R}{K_{t+1}^R}f'\left(\frac{I_{t+1}^R}{K_{t+1}^R}\right)\right)\right)\right) = P_t\ Q_{T,t}, \quad (5)$$

where: $Q_{T,t}$ is Tobin's Q ratio:

$$Q_{T,t} = \left(f'\left(\frac{I_t^R}{K_t^R}\right)\right)^{-1}. \quad (6)$$

Non-Ricardian households take into account only the current period, so during each period they maximize the following utility function:

$$U^{NR} = \ln C_t^{NR} - \frac{\left(N_t^{NR}\right)^{1+\varphi}}{1+\varphi}, \quad (7)$$

where: C_t^{NR} and N_t^{NR} is consumption and labour supply of non-Ricardian households, respectively.

Non-Ricardian households do not make decisions based on inter-temporal budget constraint, because of the lack of access to credit markets. In case of rule-of-thumb households the budget constraint becomes:

$$P_t\ C_t^{NR} + P_t\ T_t^{NR} = W_t\ P_t\ N_t^R\ , \tag{8}$$

where: T_t^{NR} - lump sum tax paid by non-Ricardian households.

Thus, in real terms we obtain:

$$C_t^{NR} = W_t\ N_t^R - T_t^{NR}\ . \tag{9}$$

We assume the competitive labour market in the model. Thus, the labour supply of both Ricardian and non-Ricardian households must satisfy:

$$W_t\ = C_t^R \left(N_t^R\right)^{\varphi}, \tag{10}$$

$$W_t\ = C_t^{NR} \left(N_t^{NR}\right)^{\varphi}. \tag{11}$$

Let us define C_t , N_t as aggregate level of consumption and labour, respectively. Thus:

$$C_t\ = \lambda C_t^{NR} + (1-\lambda) C_t^R, \tag{12}$$

$$N_t\ = \lambda N_t^{NR} + (1-\lambda) N_t^R\ , \tag{13}$$

whereas in case of aggregate level of investments (I_t), capital (K_t) and bonds (B_t) we obtain:

$$I_t\ = (1-\lambda) I_t^R, \tag{14}$$

$$K_t\ = (1-\lambda) K_t^R, \tag{15}$$

$$B_t\ = (1-\lambda) B_t^R, \tag{16}$$

because only Ricardian households invest and benefit from the credit market. Therefore, they have all investments, capital stock and bonds.

We assume that there is a continuum of monopolistically competitive firms, which produce differentiated intermediate goods.

The production function of final goods (Y_t) is given by the following formula:

$$Y_t = \left(\int_0^1 y_t(i)^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{1-\eta}}, \tag{17}$$

where: $y_t(i)$ is an intermediate good *i* , $\eta > 0$, $\frac{\eta}{\eta-1} \equiv 1+\mu_p$ is frictionless price markup.

Thus, we obtain:

$$y_t(i) = P_t\left(\frac{p_t(i)}{P_t}\right)^{-\eta}, \tag{18}$$

$$P_t = \left(\int_0^1 p_t(i)^{1-\eta}\, di\right)^{(1-\eta)^{-1}}, \tag{19}$$

where: $p_t(i)$ is price of intermediate good *i.*

We assume that prices of intermediate goods are set according to Calvo (1983) schedule:

$$P_t = \left((1-\xi_p)P_t^{*1-\eta} + \xi_p P_{t-1}^{\ 1-\eta}\right)^{(1-\eta)^{-1}}, \tag{20}$$

where: P_t^* is price optimized at time *t*, $\xi_p \in (0,1)$.[4]

The production function of intermediate good is given by Cobb-Douglass function with a constant returns technology:

$$y_t(i) = k_t(i)^{-\alpha} n_t(i)^{1-\alpha}, \tag{21}$$

where: $k_t(i)$ and $n_t(i)$ is respectively capital and labour hired by a firm to produce intermediate good *i*.

In the analysed model, the real marginal cost (MC_t) is given by formula:

$$MC_t = \frac{\left(1+r_t^k\right)^{\alpha} W_t^{1-\alpha}}{\alpha^{\alpha}\left(1-\alpha\right)^{1-\alpha}}. \tag{22}$$

The budget constraint of government is:

$$P_t T_t + \frac{B_{t+1}}{(1+r_t)} = B_t + P_t G_t, \tag{23}$$

where: T_t and G_t is aggregate level of taxes and government spending, respectively.

Taxes are paid by both Ricardian and non-Ricardian households:

$$T_t = \lambda T_t^{NR} + (1-\lambda)T_t^{R}. \tag{24}$$

Government spending deviations from steady state are described by first order autoregressive process:

[4] *On the basis of assumptions concerning monopolistic competition and Calvo (1983) price schedule the model generates standard new Keynesian Phillips curve (see for example Saman & Pauna, 2013).*

$$\frac{G_t - G^*}{Y^*} = \rho_{g/y} \frac{G_{t-1} - G^*}{Y^*} + \xi_t \ , \tag{25}$$

where: G^* and Y^* is steady state level of government spending and GDP respectively, $\rho_{g/y} \in (0,1)$.

Similarly as Leeper (1991), Chung, Davig and Leeper (2004) and Davig and Leeper (2011) we assume that taxes adjust to fulfil fiscal policy rule. In the model taxes depend positively on government spending and debt and GDP, that is:

$$T_t - T^* = \phi_{g/y}\left(G_t - G^*\right) + \phi_{B/y}\left(\frac{B_t}{P_{t-1}} - \frac{B^*}{P^*}\right) + \phi_Y\left(\frac{Y_t - Y^*}{Y}\right), \tag{26}$$

where: B^* and P^* is are steady state level of bonds and price respectively, $\phi_{g/y}, \phi_{B/y}, \phi_Y > 0$.[5]

Central bank sets the nominal interest rate according to the following rule:

$$r_t = r^* + \phi_\pi \pi_t \ , \tag{27}$$

where: r^* - steady state interest rate, π_t - inflation, $\phi_\pi \geq 0$. That is, we assume Taylor (1993) rule with zero inflation target and zero coefficient on output gap.

The model is closed by standard equilibrium condition on the goods market:

$$Y_t = C_t + I_t + G_t \ . \tag{28}$$

Under the above-mentioned assumptions, we get the following log-linearized model, in which variables are defined as the log-deviations from the steady state:[6]

$$c_t = c_{t+1} - \frac{(1-\lambda)(\mu^p \varphi \frac{C^*}{Y^*} + 1 - \alpha)(r_t - \pi_{t+1}) - \lambda\varphi((1-\alpha)(1+\varphi)\Delta n_{t+1} - \mu^p \Delta t^R_{t+1})}{\mu^p \varphi \frac{C^*}{Y^*} + (1-\alpha)(1-\lambda(1+\varphi))} \tag{29}$$

$$w_t = c_t + \varphi n_t \tag{30}$$

$$i_t - k_t = -\frac{1}{f''(\delta)\delta} q_t \tag{31}$$

$$q_t = \beta q_{t+1} + (1 - \beta(1-\delta)) r^k_{t+1} - r_t + \pi_{t+1} \tag{32}$$

$$k_{t+1} = (1-\delta)k_t + \delta i_t \tag{33}$$

$$\pi_t = \beta \pi_{t+1} - \frac{(1-\beta\xi_p)(1-\xi_p)}{\xi_p} \hat{\mu}^p_t \tag{34}$$

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[5] *Thus, we assume sustainable fiscal policy (see Bohn, 2005). Another version of sustainability functions are analysed among others by Albu (2002), Ballabriga & Martinez-Mongay (2005), Greiner, Köller & Semmler (2006), Albu (2011) and Krajewski, Mackiewicz & Szymańska (2016).*

[6] *For simplicity, symbol of expected value is omitted.*

$$\hat{\mu}_t^p = (y_t - n_t) - w_t \tag{35}$$

$$y_t = \alpha k_t + (1-\alpha) n_t \tag{36}$$

$$b_{t+1} = \frac{1}{\beta}((1-\phi_{B/y}) b_t + (1-\phi_{g/y}) g_t - \phi_Y \alpha k_t - \phi_Y (1-\alpha) n_t), \tag{37}$$

$$y_t = \frac{C^*}{Y^*} c_t + \frac{I^*}{Y^*} i_t + g_t \ , \tag{38}$$

where: C^* and I^* is steady state level of consumption and investment respectively. Monetary rule is described by equation (27) whereas fiscal shocks by equation (25).

The above set of linearized equations can be reduced to the system of six variables, that is shown in terms of hours, consumption, inflation, capital, public debt and government spending. As a result, the final system of linearized equations can be written in the following matrix form:

$$\begin{bmatrix} 0 & 0 & 0 & 1 & 0 & \frac{\delta}{1-\Phi_1} \\ 0 & 0 & \beta & 0 & 0 & 0 \\ -\frac{\lambda(1-\alpha)(1+\varphi)}{\Phi_2} & 1 & \frac{(1-\alpha)\mu^P}{\Phi_2}\frac{C^*}{Y^*} & 0 & \Phi_3\phi_{B/y} & \Phi_3(\rho_{g/y}-1)\phi_{B/y} \\ \Phi_4(1+\varphi)+\beta(1-\alpha) & \Phi_4-\beta\Phi_1 & \frac{\Phi_4-1}{f''(\delta)\delta} & -\Phi_4-\beta(1-\Phi_1-\alpha) & 0 & 1-\beta\rho_{g/y} \\ \frac{(1-\alpha)\phi_Y}{\beta} & 0 & 0 & \frac{\alpha\phi_Y}{\beta} & 1 & \frac{\phi_{g/y}-1}{\beta} \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} n_{t+1} \\ c_{t+1} \\ \pi_{t+1} \\ k_{t+1} \\ b_{t+1} \\ g_t \end{bmatrix}$$

$$= \begin{bmatrix} \frac{\delta(1-\alpha)}{1-\Phi_1} & \frac{\delta\Phi_1}{1-\Phi_1} & 0 & 1-\delta+\frac{\delta\alpha}{1-\Phi_1} & 0 & 0 \\ -\frac{(\alpha+\varphi)\Phi_5}{\xi_p} & -\frac{\Phi_5}{\xi_p} & 1 & \frac{\alpha\Phi_5}{\xi_p} & 0 & 0 \\ -\frac{\lambda(1-\alpha)(1+\varphi)}{\Phi_2} & 1 & \frac{\phi_\pi(\Phi_4-1)}{f''(\delta)\delta} & 0 & \Phi_3\phi_{B/y} & 0 \\ 1-\alpha & -\frac{C^*}{Y^*} & -\frac{\phi_\pi(1-\Phi_1)}{f''(\delta)\delta} & \Phi_1+\alpha-1 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1-\phi_{B/y}}{\beta} & 0 \\ 0 & 0 & 0 & 0 & 0 & \rho_{g/y} \end{bmatrix} \begin{bmatrix} n_t \\ c_t \\ \pi_t \\ k_t \\ b_t \\ g_{t-1} \end{bmatrix} + \zeta_t$$

where:

$$\Phi_1 = \frac{C^*}{Y^*} + \frac{G^*}{Y^*}, \ \Phi_2 = \frac{C^*}{Y^*}\mu^P - \lambda(1-\alpha), \ \Phi_3 = \frac{\lambda\mu^P}{\Phi_2}, \ \Phi_4 = -\frac{1-\beta(1-\delta)(1-\Phi_1)}{f''(\delta)\delta},$$

$$\Phi_5 = (1-\beta\xi_p)(1-\xi_p).$$

IV. Parameters

We analyse the dynamics of the model for six non-EMU Central and Eastern European countries: Bulgaria, Croatia, the Czech Republic, Hungary, Poland and Romania. The parameters of the model are calibrated for quarterly data.

The approximation of the share of non-Ricardian households which face liquidity constraint is estimated as the percentage of total population unable to face unexpected financial expenses. The Eurostat data concerning liquidity constraint in analysed non-EMU countries of CEE is shown in Table 1.

Table 1

The Percentage of Total Population Unable to Face Unexpected Financial Expenses in 2015

Country	Percentage of non-Ricardians
Bulgaria	53.4
Croatia	59.8
Czech Republic	36.0
Hungary	72.2
Poland	42.3
Romania	51.4

Source: Eurostat.

The share of non-Ricardian households varies significantly among the CEE countries - in Hungary is two times higher than in the Czech Republic.[7] However, in all the analysed countries the share of households which face liquidity constraint is higher than the average share for the Euro Area, which is 35.1%. The elasticity of output with respect to capital is set at 0.4, because parameter α in the Central and Eastern European countries is significantly higher than in the US or Western European countries (see for example Krajewski, 2012).

Other parameters are calibrated on standard values assumed in literature (initially for US economy and Euro Area) which is the frequently used procedure in the DSGE models for the CEE countries (see for example Stork, Vavra and Zavacka, 2009). We do not assume heterogeneity of these parameters across countries, to separate the effect of the heterogeneity of the share of non-Ricardian households. The parameter $\rho_{g/y}$ describing persistency of government spending shocks is set to 0.9. The fiscal policy rule parameters $\phi_{g/y}$, $\phi_{B/y}$, ϕ_Y are assumed to be equal to 0.1, 0.33 and 0.1, respectively. The parameter in the Taylor rule ϕ_π is set equal to 1.5. Discount factor, rate of depreciation are set at standard levels for quarterly data (that is 0.99 and 0.025, respectively). We assume the average price duration of one year, what gives the parameter ξ_p value of 0.75. The elasticity of investment-capital ratio with respect to Tobin's Q ratio was set equal to 1. Steady state price markup is assumed to be equal

[7] *The specific case of Hungarian households' savings is described in details by Bethlendi (2009).*

to 0.2. The elasticity of wages with respect to hours is 0.2, similarly as in Rotemberg and Woodford (1999).

V. Dynamics of the Model

We used the Dynare program to analyse the dynamics of key macroeconomic variables on the basis of theoretical model. In particular, the relaxation algorithm was applied to solve non-linear equations (see Juillard, 1996). The analysis was based on impulse-response functions – the effects of 1% of GDP government spending shock. The effects of government spending shock on key variables of the model in analysed countries are shown in Appendix 1.

The government spending shock has a positive but transitory impact on GDP in all non-EMU CEE countries. However, the fiscal multipliers vary significantly among analysed countries. The fiscal multipliers obtained on the basis on impulse-response analysis are shown in Table 2.

Table 2

Government Spending Multipliers

Country	Multiplier
Bulgaria	1.2
Croatia	1.5
Czech Republic	0.9
Hungary	2.9
Poland	1.0
Romania	1.2

The share of non-Ricardian households has significant impact on fiscal multipliers. On the one hand, the fiscal multiplier is lower than one in the Czech Republic, where the share of non-Ricardian households is the lowest. On the other hand, the fiscal multiplier reaches almost 3 in Hungary, where the share of non-Ricardians is the highest. Thus, the share of rule-of-thumb households significantly influences the effectiveness of fiscal policy in CEE countries with derogation.

The results have important economic implications in the context of potential future access of CEE countries with derogation to Euro Area. Fiscal policy is a key macroeconomic tool in case of asymmetric shocks, because monetary policy is responsible only for mitigating GDP fluctuations in case of shocks affecting whole monetary union. Thus, the effectiveness of fiscal policy is an important factor influencing the balance of pros and cons of euro adoption. In CEE countries with derogation, because of a high share of non-Ricardians, fiscal multipliers are relatively high, which may be indicated as potential argument for accessing euro. On the other hand, the share of rule-of-thumb households will presumably decrease as the GDP *per capita* will increase in CEE counties. This means that the effectiveness of fiscal policy in stabilizing macroeconomic fluctuations in this group of countries will presumably decrease in time. It should be however noticed that, although the share of non-Ricardians is generally

higher in CEE countries than in the Euro Area, the analysed region is highly heterogeneous – government spending multipliers significantly vary across countries.

The model predicts a positive correlation between government spending and consumption of non-Ricardian households and the opposite relationship in case of Ricardian households. Thus, the direction of relationship between government spending and overall consumption depends on the share of non-Ricardian.

The correlation between these variables in non-EMU Central Eastern European countries obtained on the basis of the analysed model is shown in Table 3.

Table 3

Correlation between Government Spending and Consumption

Country	Correlation
Bulgaria	0.85
Croatia	0.90
Czech Republic	- 0.26
Hungary	0.96
Poland	0.42
Romania	0.81

There is a positive correlation between government spending and consumption in almost all non-EMU CEE countries. We obtained negative relationship between analysed variables only in the Czech Republic, which is the country with the lowest share of non-Ricardians.

Despite the share of households with liquidity constraints in the Czech Republic and Poland does not differ significantly, the direction of fiscal policy impact on consumption is different in these countries. Thus, the obtained results indicate, that the effects of government spending shocks on consumption are very sensitive to the share of non-Ricardian households.

VI. Conclusion

The results of new Keynesian model with heterogeneous households show that the effects of government spending in non-EMU Central and Eastern European countries depend on the share of non-optimizing households with liquidity constraints.

Firstly, the results indicate that the share of non-Ricardian households has significant impact on the effectiveness of fiscal policy. The government spending multiplier reaches almost 3 in country with highest share of non-Ricardians (Hungary), whereas in country with lowest share of non-Ricardians (Czech Republic) is lower than one.

Secondly, the impulse response analysis shows that dynamics of consumption are very sensitive to the share of non-Ricardian households. Even relatively small differences between countries in this respect translate into significant differences in path of consumption. As a result, in some countries (Bulgaria, Croatia, Hungary, Romania) strong positive correlation between government spending and consumption was

observed, whereas in other (Czech Republic) model predicts negative correlation between these variables.

The share of non-Ricardian households in non-EMU Central and Eastern European countries is generally higher than in euro area. It means that the fiscal multipliers in CEE countries with derogation are higher than in the Euro Area. Moreover, in most analysed countries we observe positive relationship between government spending and consumption, contrary to Coenen and Straub (2005) study for the Euro Area.

The results of the study have implications for policy evaluation in CEE countries – they show that expansive fiscal policy in almost all countries of the region is an effective tool of stimulating both GDP and private consumption. On the other hand, the results indicate that there is a trade-off between the effectiveness of fiscal policy and household's access to the credit market.

We assume in this study, analogically as in Galí Lopez-Salido and Vales (2007), that the share of non-Ricardian households is exogenous. However, Furceri and Mourougane (2010) assume that the share of households with liquidity constraints is a function of output gap. The impact of output gap on the share of non-Ricardians is one of potential reasons of increased fiscal policy effectiveness in CEE countries during crisis, which was observed among others by Furceri and Zdzienicka (2011). The analysis of the effects of fiscal policy in CEE countries under the assumption of non-Ricardian households share endogeneization is the scope for further research.

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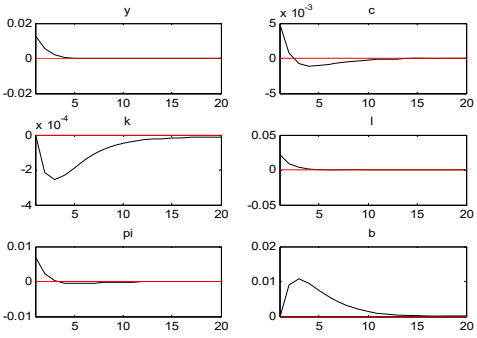
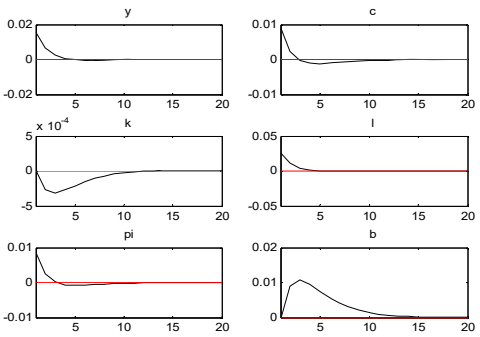
Appendix

The Effects of 1% of GDP Government Spending Shock



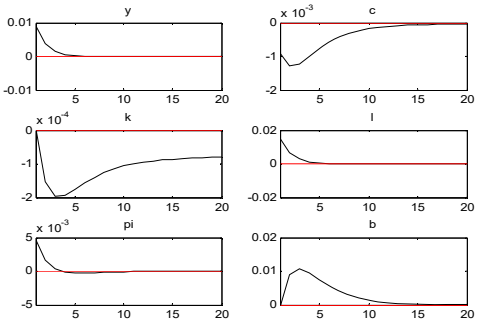
Bulgaria



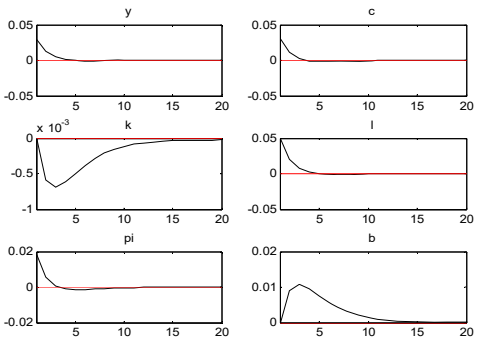
Croatia

The Effects of 1% of GDP Government Spending Shock

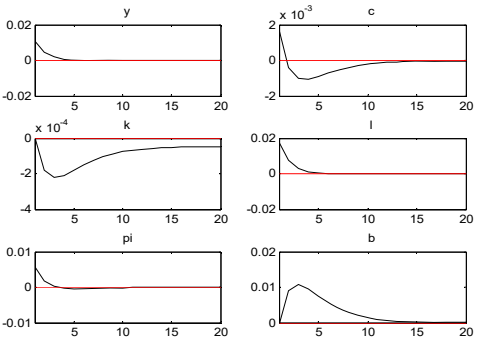
Czech Republic



Hungary



Poland



Romania