Fiscal Consolidation and its Reflection in Euro Area Current Account Imbalances

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Abstract
The main goal of this paper is to establish a standard intertemporal model with fiscal policy variables included that would allow us to investigate impact of fiscal expansionary policy and fiscal consolidation in the Euro Area countries on evolution of current account imbalances. As shown in empirical study by Holinsky et al. (2012) the fiscal consolidation in North Euro area countries stood mainly behind their current account surpluses while in case of South countries the decline in private sector savings was the major driver of current account deficits. Therefore, we use intertemporal model by Roubini (1988) and combine it with theoretical model presented in Blanchard and Giavazzi (2002) in order to analyze link between public investment-saving decisions and their impact on current account deficit. Possible evolution of current account imbalances within the Euro Area is further investigated with help of our simple model taking into account current pressure on fiscal consolidation across European countries along with negative perspectives of their future economic growth. Our results suggest that the increasing level of external imbalances is not likely to be supported by the fiscal expansion before the debt crisis and recent fiscal consolidation should help to close the gap between surplus and deficit countries.

Keywords: current account imbalances, intertemporal model, public deficit
JEL codes: F32, F36, F41, E62

1. Introduction and Literature Overview

In light of the recent Eurozone debt crisis question of relationship between current account and fiscal balance has gained once again on importance. As argued by Holinsky et al. (2012) in his empirical study the imbalances on current accounts in Eurozone have arisen as ***result of substantial fiscal consolidation*** in the so called North countries and decline in private-sector savings in the so called South countries. This statement clearly (and implicitly) assumes that there exists a relationship between public deficit and external imbalances (otherwise North countries would not improve their external balances). This issue of linkage between fiscal policy and external imbalances is the more important the more discussion turns to overall tendency of common monetary area to follow the path of economic divergence in external sector (Barnes, 2010; Uxó, 2011 and others). Additionally, ongoing fiscal consolidation (revenue or expenditure-based) has had and will have a substantial impact on domestic economies as well as on the overall structure of Euro Area economy.

However, the discussion whether there is a connection between budget deficit and external imbalances in not anew and surely does not solely focus on the Eurozone. The substantial volume of studies had been devoted to the problem of increasing imbalances in current accounts between the United States, China and other major economic players (Roe et al., 2011 as an example).[1] Historically, the link between those two variables had been investigated during the "Reagan fiscal experiment" period when we saw how unsustainable budget deficits had widened current account balances (Leachman and Francis, 2002 among others)

[1] In year 2006 one special issue of Journal Policy Modelling (Vol. 28, No. 6, p. 603 – 712) was dedicated to the debate on twin deficits, growth and stability of the US economy.

Study by Holinsky (2012) and Leachman and Francis (2002) can be assigned to the first strand of theoretical literature that argues in favor of existence of link between public savings-investment gap and external imbalance (so called twin deficit hypothesis) and is based on Keynesian theory of domestic absorption and Mundell-Flemming model. Second approach traditionally utilizes ideas of intertemporal models used in modern open macroeconomics that traces back to standard basic microeconomic model proposed by Fisher (1930).

Intertemporal model in its simplest form focuses on decision of representative household that tries to smooth its consumption over time. By applying Fisher micro model on macro level for economic conditions of small and open economy we arrive to the standard form as described in Obstfeld and Rogoff (1996).[2] While standard theory of intertemporal model has been proposed a long time ago first empirical tests of the intertemporal approach to the balance of payments can be contributed to Sheffrin and Wo (1990), Otto (1992) and Ghosh (1995). Since then the intertemporal model has been extended in various directions by investigating impact of various factors, such as time-variable interest rate, nontraded goods or even monetary policy (Bergin and Sheffrin, 2000; Bussiére et al., 2006 or Ca'Zorzi and Rubaszek, 2012). However, those models do not usually account for presence of fiscal deficit as by very setup of the model the Ricardian equivalence (Barro, 1974; Barro, 1989) is expected to hold. In other words, the government budge imbalances are irrelevant to resource allocation as the change in public savings are offset by exactly the same amount in private savings and the effect on current account balance is therefore zeroized. So far, the empirical tests of Ricardian equivalence (REH) have not shed light on its applicability and the debate remains unresolved.

In opposition to the Ricardian equivalence representing one of the key implications of intermporal models stands Keynesian theory of domestic absorption. Contrary to the intertemporal models, an increase in budget deficit induces domestic absorption and consequently leads to an increase in import resulting in worsening current account balance. Additionally, increase in budget deficit puts an upward pressure on domestic interest rate that in turn attracts inflow of foreign capital, appreciation of nominal exchange rate and increase in current account deficit as analytically showed in Mundell-Flemming model.[3] The so called twin deficits hypothesis holds in those cases when deterioration in fiscal deficit induces worsening of current account deficits. Within the framework of Mundell-Flemming the degree of capital mobility and the Feldstein-Horioka puzzle (Feldstein and Horioka, 1980) linked to it are other issues that complicate analysis of relationship between current account and fiscal deficit.[4]

Traditional test of the link between current account and fiscal deficit (if the Ricardian equivalence is expected not to hold) is usually based on various regression models (test of causality by Chang and Hsu, 2009; Marinheiro, 2007; ARDL model by Khan and Saeed; 2012 among others) among which the model proposed by Fidrmuc (2003), for example, incorporates both tests for twin deficit as well as Feldstein-Horioka paradox. So far, the empirical literature seems to incline to at least partially confirm the existence of twin deficit although but with significant differences in time (Fidrmuc, 2003) and countries (for developing countries Kouassi et al., 2004 or Baharumshah et al., 2009; for developed countries Bagnai, 2006).

By rejecting the Ricardian equivalence there is a room for investigating the presence of link between fiscal deficit and current account balances. The second question is, however, which causal direction this link acquires. Summers (1988) argues that there can be periods and countries when reversal causation between fiscal deficits and current account is observable. In the presence of the "current account targeting" a government tries to eliminate external imbalances and uses budget as a tool for achieving this goal. Additionally, existence of significant feedback can lead to the situation when causality runs in both directions, thus the relationship between current account and budget deficit is bi-directional.

[2] In our text we partially base our model on influential book on international macroeconomics by Obstfeld and Rogoff (1996) as this has become a standard reference and starting point of further analyses.

[3] The effect of changes in nominal exchange rate on current account balance can differ from short-term and long-term perspective due to the so called J-curve phenomenon (and Marshall-Lerner condition).

[4] With high capital mobility the link between domestic savings and investments grows weaker and current account balance and fiscal deficit should follow each other more closely. However, this holds in non-Ricardian environment.

As briefly discussed previously, the proponents of two strands of literature (those of the REH and those of the TDH) seem to be standing on totally opposite sides of one river. Rogoff and Obstfeld (1996) show that the REH fails in presence of (1) positive population growth or (2) in overlapping generations model.

Interestingly, the bridge between standard intertemporal model (without overlapping generations and positive population growth), rejection of the REH and presence of the fiscal deficit along with current account deficit is proposed in relatively old paper by Roubini (1988). It is shown that with households that smooth their consumption and the government that tries to minimize impact of income taxes on domestic economy (thus the name "tax smoothing policy") the current account balance reflects fiscal deficit as well as the investment decisions. Intriguingly, final equation in Roubini (1988) almost fully resembles the equation tested by Fidrmuc (2003). The model by Roubini (1998) thus incorporates advantages of both approaches in theoretical literature: (1) decisions of economic agents are rational and forward looking which results in fact that households (government) smooth their consumption (tax disturbances); (2) coexistence of fiscal deficit and current account imbalances is not ruled out by the REH hypothesis.[5]

The main goal of this paper is therefore to create a model that would be able to integrate key elements of various intertemporal models as well as the twin deficit hypothesis (along with Feldstein-Horioka paradox) and to use it for qualitative analysis of the current account imbalances emerging within the Euro Area economy from perspective of expansionary fiscal policy (before current debt crisis) and fiscal consolidation (after the debt crisis). In other words we would like to investigate link between fiscal policy and increasing heterogeneity in the external imbalances of the Euro Area member states.

In order to achieve this goal we proceed in the following steps. Firstly, we use skelet of the model proposed by Roubini (1988) and apply it for two-period model of small open economy. Combined with approached used by Blanchard and Giavazzi (2002) we additionally investigate influence of domestic economic growth on current account balance as well as the role of the wedge between world interest rate and interest rate for borrowing in international financial markets imposed on domestic agent. Thirdly, we distinguish between subjective domestic discount factor and world interest rate as we would like to analyze the impact of this difference on magnitude of current account imbalances. As recent empirical evidence shows (Wang et al., 2010) cross country variation in time preferences can not be simply explained by economic variables, such as interest rates or inflation, thus the distinction between market interest rate and subjective discount factor can be crucial. As pointed out by Obstfeld and Rogoff (1996) when the subjective time-preference rate and the market interest rate differ the motivation to smooth consumption is modified by an incentive to tilt the consumption path which consequently affects evolution of the current account balance.

In order to make the model as simple as possible, we opt for two-period model with zero initial level of indebtedness, without investment decisions, without inclusion of world output growth and without other extended features of intertemporal models (time-variant interest rate, tradable and nontradable goods, exchange rates and others). However, even without these additional features the model can provide fruitful insights into the possible evolution of current account balances in presence of fiscal consolidation during the current Eurozone debt crisis. We leave inclusion of all those variables into more sophisticated model for further research.

2. Structure of the Model

Let us assume that the economy produces own good (only one). Each economy consists out of two sectors – private (households) and public (government). In this model we allow for indebtedness of both private as well as public sector. The level of public deficit and private deficit (change in indebtedness) is given by the following rules:

[5] The inclusion of fiscal policy into the standard intertemporal model is also proposed in the paper by Bussiére et al. (2004). However, authors do not model government decisions endogenously but rather distinguish between two groups of households – non-Ricardian and Ricardian. The presence of fiscal surplus is direct implication following from the introduction of liquidity constraints. Fiscal surplus induces a current account surplus since it lowers disposable income of non-Ricardian households and thereby overall consumption.

$$D_t^P - D_{t-1}^P = I_t^P - (Y_t - T_t - C_t - rD_{t-1}^P) = I_t^P - S_t^P$$
$$B_t - B_{t-1} = I_t^G - (T_t - G_t - rB_{t-1}) = I_t^G - S_t^G \quad (1)$$

As we are not interested in examining effects of investment decision and capital formation we transform relationships in [1] to the following equations:

$$D_t^P - D_{t-1}^P = C_t^{/} - (Y_t - T_t - rD_{t-1}^P)$$
$$B_t - B_{t-1} = G_t^{/} - (T_t - rB_{t-1}) \quad [2]$$

From now on the households' consumption $C_t^{/}$ includes both consumption of nondurable goods as well private investments; the same holds for the government consumption $G_t^{/}$. The current account balance can be therefore expressed as the following relationship between private and public deficit calculated as the product of [1] and [2]:

$$-CA_t = \left(D_t^P - D_{t-1}^P\right) + \left(B_t - B_{t-1}\right) = D_t - D_{t-1}$$
$$CA_t = Y_t - C_t^{/} - G_t^{/} - r\left(D_{t-1}^P + B_{t-1}\right) \quad [3]$$

In order to simplify our analysis let us assume that in the period 1 the level of net foreign assets in public and private sector was equal to zero[6] which means that the current account balance depends on the following variables:

$$CA_t = Y_t - C_t^{/} - G_t^{/} \quad [4]$$

Let us now derive optimal consumption path for households as well as the optimal level of taxation for government.

2.1 Households' Optimization Problem

Households live for two periods and maximize their utility which is of the following form:

$$U = \log(C_t^{/}) + \beta \log(C_{t+1}^{/}) = \log(C_t^{/}) + \frac{1}{1+\delta}\log(C_{t+1}^{/}) \quad [5]$$

Consumers discount future consumption with the subjective time preference rate δ. The parameter $\beta = \frac{1}{1+\delta}$ is the standard discount factor and can be interpreted as the subjective discount factor of domestic households. The intertemporal budget constraint for households is of the following form:

$$C_t^{/} + \frac{1}{1+r^*}\frac{1}{1+x}C_{t+1}^{/} = Y_t - G_t + \frac{1}{1+r^*}\frac{1}{1+x}\left(Y_{t+1} - G_{t+1}\right) \quad [6]$$

Parameter x is wedge over world consumption real interest rate (can be understood as the risk premium of domestic country over world interest rate). The variable r^* stands for world interest rate. Movements in current account balance reflect saving-investment decision of domestic country and production is fully exogenous.

Thus, the solution to the intertemporal optimization problem is found by first-order conditions of the following optimization problem:

[6] This assumption does not change the results we are interested in; it only simplifies the following derivations. Additionally, we can assume that the economy we are interested in has recently opened towards international capital markets and the period 1 is the first time when it can finance its domestic needs with foreign capital.

$$\max_{C_t} \quad U = \log(C_t^{/}) + \beta \log(C_{t+1}^{/})$$

$$\text{s.t.} \quad C_t^{/} + \frac{1}{1+r^*}\frac{1}{1+x}C_{t+1}^{/} = Y_t - G_t + \frac{1}{1+r^*}\frac{1}{1+x}\left(Y_{t+1} - G_{t+1}\right)$$

$$L: \log(C_t^{/}) + \beta \log(C_{t+1}^{/}) + \lambda\left(Y_t - G_t + \frac{1}{1+r^*}\frac{1}{1+x}\left(Y_{t+1} - G_{t+1}\right) - C_t^{/} - \frac{1}{1+r^*}\frac{1}{1+x}C_{t+1}^{/}\right)$$

$$\partial C_t^{/} \quad \frac{1}{C_t^{/}} = \lambda$$

$$\partial C_{t+1} \quad \beta\frac{1}{C_{t+1}^{/}} = \lambda\frac{1}{1+r^*}\frac{1}{1+x} \qquad \beta(1+r^*)\left(1+x\right)\frac{1}{C_{t+1}} = \lambda$$

$$\textit{Euler equation}: \qquad C_t^{/} = \beta^{-1}(1+r^*)^{-1}\left(1+x\right)^{-1}C_{t+1}^{/} \qquad [7]$$

By Euler equation, the current consumption is given by the discounted value of future consumption. The Euler equation in this two-period problem is the standard one. Assuming that in equilibrium (with perfect capital movement) the $\beta = \frac{1}{1+r^*}$ and there is no wedge over world interest rate, the equation in [7] simplifies to standard Euler equation for this type of households optimization problem: $C_t^{/} = C_{t+1}^{/}$.

Let us now rewrite subjective discount factor with help of subjective time preference rate δ.

$$C_t = \frac{1+\delta}{(1+r^*)\left(1+x\right)}C_{t+1} = \gamma(1+x)^{-1}C_{t+1} \qquad [8]$$

As apparent, the current consumption is driven by ratio of subjective discount factor and world interest rate adjusted for a wedge (risk premium). We would like to distinguish between subjective discount rate and world interest rate as we claim that the evolution on the current account is affected, among others, by subjective and country-specific time preferences.[7]

Combining Euler equation with the formula for current consumption from the intertemporal budget constraint we get the optimal path for current spending of domestic households:

$$C_t^{/} + \beta C_t^{/} = \underbrace{Y_t - G_t + \frac{1}{1+r^*}\frac{1}{1+x}\left(Y_{t+1} - G_{t+1}\right)}_{Wealth=W_t} \qquad [9]$$

The current households' consumption is thus driven by subjective discount factor and present value of households' wealth:

$$C_t^{/} = \frac{1}{1+\beta}W_t \qquad [10]$$

In the environment of the households optimizing their present consumption with perfect foresight the current consumption is given by present value of current and future domestic product minus government spending adjusted for subjective time-discounting preference. If present the level of initial households' indebtedness along with interest rate payments would negatively affect the current consumption.

2.2 Government's Optimization Problem

Government tries to smooth distortionary taxes in the presence of temporary shocks to public expenditures and output. The concept of the so-called "equilibrium approach to fiscal policy" is

[7] It is assumed that in a perfect capital market where individuals can borrow and lend freely, the personal taste concerning time preference of patience should not matter because intertemporal choices can be made such that the discount rate corresponds to the interest rate in the market, in order to avoid arbitrage opportunities. Wang et al. (2010) however shows that time preferences vary among different group of participants from different countries and these differences can not be explained by various economic variables.

applied here. The government would like to minimize distortionary effects of income taxation and to choose optimal path of taxes and public debt accordingly. The function that represents the distortionary effects of income taxation is assumed to be a convex function of the tax rate, therefore $K(\tau_t) = (\tau_t)^2$.

The government budget constraint is of the following form:

$$G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1} = T_t + \frac{1}{1+r^*}\frac{1}{1+x}T_{t+1} \qquad [11]$$

Thus, the solution to the government's optimization problem is found by corresponding first-order conditions.

$$\min_{\tau_t,\tau_{t+1}} \quad K(\tau_t)Y_t + \beta K(\tau_{t+1})Y_{t+1}$$

$$\text{s.t.} \quad G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1} = \tau_t Y_t + \frac{1}{1+r^*}\frac{1}{1+x}\tau_{t+1}Y_{t+1}$$

$$L: \quad (\tau_t)^2 Y_t + \beta(\tau_{t+1})^2 Y_{t+1} + \mu\left(G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1} - \left(\tau_t Y_t + \frac{1}{1+r^*}\frac{1}{1+x}\tau_{t+1}Y_{t+1}\right)\right)$$

$$\partial\tau_t \quad 2\tau_t Y_t = \mu Y_t$$

$$\partial\tau_{t+1} \quad \beta 2\tau_{t+1}Y_{t+1} = \frac{1}{1+r^*}\frac{1}{1+x}\mu Y_{t+1} \qquad \beta(1+r^*)(1+x)2\tau_{t+1} = \mu$$

$$Euler\ equation: \quad \tau_t = \beta(1+r^*)(1+x)\tau_{t+1} \qquad [12]$$

By Euler equation, the best predictor of current level of tax rate is given by the future tax rate which is adjusted for subjective discount factor, world interest rate and financial wedge. In a specific case, when there is no wedge and subjective discount factor is equal to world interest rate, the Euler equation for taxes acquires its standard form.[8] Take now the government budget constraint [11] and combine it with the Euler equation in [12] to derive the optimum path for tax rate:

$$G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1} = \tau_t Y_t + \frac{1}{\beta}\frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}\tau_t Y_{t+1}$$

$$\tau_t\left(Y_t + \frac{1}{\beta}\frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}Y_{t+1}\right) = G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1}$$

$$\tau_t = \frac{1}{\left(Y_t + \frac{1}{\beta}\frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}Y_{t+1}\right)}\left(G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1}\right) \qquad [13]$$

Now let us recall the definition of government deficit stated in [2] and combine it with the optimal tax rate derived in [13], knowing that $T_t = \tau_t Y_t$:

$$B_t - B_{t-1} = G_t^{/} - T_t$$

$$DEF_t = G_t^{/} - Y_t\frac{1}{\left(Y_t + \frac{1}{\beta}\frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}Y_{t+1}\right)}\left(G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1}\right) \qquad [14]$$

In the equation [14] we still keep the B_{t-1} variable even though we assume that in the first period the public debt is zero. In this sense, the public deficit defined in [14] is given only by the current level of government consumption and current tax level.

2.3 Current Account Balance

[8] In standard form and in presence of expectations the tax rate will follow random walk without drift.

Let us recall the definition of current account without investments and with zero initial level of indebtedness in period one. Then the ratio of current account to the current product can be expressed in the following way:

$$CA_t = Y_t - C_t^{/} - G_t^{/} \qquad [15]$$

The optimal consumption for period one in consumption smoothing environment is given by [10] and optimal level of government spending in presence of tax smoothing fiscal policy is given by [14]. Combining [10] with [14] the current account can be expressed as the following:

$$CA_t = Y_t - \frac{1}{1+\beta}\left\{Y_t - G_t + \frac{1}{1+r^*}\frac{1}{1+x}\left(Y_{t+1} - G_{t+1}\right)\right\} - \left\{DEF + Y_t \frac{1}{\left(Y_t + \frac{1}{\beta}\frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}Y_{t+1}\right)}\left(G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1}\right)\right\} \qquad [16]$$

After some manipulation we arrive to the final equation describing relationship between current account ratio to GDP and output growth rate, level of public deficit and present value of government spending adjusted for output growth rate as driving factors:

$$ca_t = \frac{CA_t}{Y_t} = \frac{1}{1+\beta}\left[\beta - \frac{1}{1+r^*}\frac{1}{1+x}\frac{Y_{t+1}}{Y_t} - \frac{(1+\beta)DEF_t}{Y_t} - \frac{1}{Y_t}\left(G_t + \frac{1}{1+r^*}\frac{1}{1+x}G_{t+1}\right)\left\{\frac{1+\beta}{\left(1+\frac{1}{\beta}\frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}\frac{Y_{t+1}}{Y_t}\right)} - 1\right\}\right] \qquad [17]$$

The equation in [17] is in some sense similar to the one derived in Blanchard and Giavazzi (2002) with two major differences. As we do not account for changes in price levels of domestically produced goods reflected in the demand function for domestically produced goods the current account is not dependent on the growth rate of world output. Secondly, by distinguishing between private and public sector the current account ratio depends on present value of public expenditures adjusted for output growth rate; a variable that is not present in Blanchard and Giavazzi (2002). With domestic discount factor equal not only to the world interest rate but also with the edge taken into consideration the current account ratio will be driven by the following forces:

$$ca_t = \frac{CA_t}{Y_t} = \frac{\beta}{1+\beta}\left[-g^Y - \frac{1+\beta}{\beta}\frac{DEF_t}{Y_t} - \frac{1}{\beta}\frac{1}{Y_t}\left(G_t + \beta G_{t+1}\right)\left\{\frac{1+\beta}{1+\beta\left(1+g^Y\right)} - 1\right\}\right] \qquad [18]$$

In a special case, when the following assumptions hold: (1) there is no change in output in equilibrium and $Y_t = Y_{t+1} = Y^P$, (2) there is no wedge for domestic economy and (3) domestic discount rate is the same as the world interest rate, the [17] simplifies to the following expression:

$$ca_t = -\frac{DEF_t}{Y} \qquad [19]$$

The equation in [18] is the same as the one derived in the Roubini (1988). No more the Ricardian equivalence holds in intertemporal model of balance of payments as not only the government spending but also the overall level of taxes has a direct, one-to-one, effect on the current account. Thus, in the presence of tax-smoothing policy in public sector and consumption-smoothing spending in private sector the changes in current account are driven by the public deficit. Yet, the equation in [18] is a very specific case likely not to hold in most of the economies not operating in equilibrium conditions. Our further analysis is therefore based on more comprehensive approach represented by the equation [17].

2.4 Impact of Fundamental Factors

Let us deal in a more detailed way with the main implications that the equation in [17] highlights. The three terms on the right side of the equation in [17] give the determinants of the current account balance: (1) output growth; (2) fiscal deficit to GDP ratio and (3) present value of government spending adjusted for output growth rate. On top of that, two of these expressions are affected by the three common factors that are related to the saving-investment decision: (1) subjective discount factor

β, (2) world interest rate r^* and (3) wedge between world interest rate x and interest rate at which domestic country can borrow at international financial market.

Firstly, we focus on impact of the changes in three key fundamental factors:

Output growth - as standard in the intertemporal model the current account balance is negatively affected by the domestic output growth. The higher the future output, the higher the current account deficit as domestic subjects increase their current consumption (and consequently the import) due to positive expectations toward future development of output growth and increase in their disposable income.

The output growth rate enters the equation in [17] as well as in [18] also in the last term on the right hand side of the equation, namely it affects the way how the current account will react to government spending in presence of positive or negative output growth. In the presence of positive output growth the government spending acts counter-cyclically as the increase in government spending lowers households' disposable income and thus balances the negative impact of output growth on current account coming from the first term in right hand side. For negative output growth the government spending acts reversely.

Public deficit – contrary to standard intertemporal model where the public deficit does not influence current account balance due to intratemporal changes between private and public saving-investment balance in our model the public deficit affects the current account inversely and on one-to-one basis. The inclusion of public deficit as one fundamental factor influencing the current account balance is in line with the twin-deficit hypothesis originally rooted in Keynesian absorption theory and fundamentally backed by the Mundell-Flemming model. The expression in [17] can be therefore seen as a bridge between intertemporal model with Ricardian equivalence and Keynesian theory with twin-deficit hypothesis.

Public spending – the effect of public spending in our model is highly dependent of the values of subjective discount factor and its relationship to the world interest rate and financial wedge. Firstly, not just the current level of public spending but the present value of public spending influences the households' disposable income and thus the current account balance. Secondly, in order for government spending to affect current account balance positively by decreasing the disposable income of households and consequently their consumption the following must be satisfied:

$$\frac{1}{(1+\delta)^2} < \frac{1}{(1+r^*)^2}\frac{1}{(1+x)^2}(1+g^Y) \qquad [19]$$

It is easy to see that in standard case (with no wedge between world interest rate and interest rate for borrowing in international markets and subjective discount factor equal to the market interest rate) the following condition is satisfied for positive output growth. Thus, the government spending will positively affect current account balance in presence of positive output growth by decreasing disposable income. But if this spending is not fully covered by income taxes the difference (public deficit) will still negatively influence the current account balance. In case of negative output growth the effect of government spending will be negative and multiplied by government deficit (spending not fully covered by income taxes).

2.5 Impact of Discount Factor

Now let us turn to the investigation of the relationship between three common factors related to the saving-investment decision and borrowing in the international financial markets and the current account balance. In standard intertemporal model, the equality between subjective discount factor and world interest rate is implied in equilibrium. In the model by Blanchard and Giavazzi (2002) the standard discount factor should incorporate not only the world interest rate but also the wedge between world interest rate and rate at which country can borrow at international financial markets in order to fulfill the condition of equality between subjective discount factor and interest rate for borrowing. In that particular case, the consumption path of aggregate consumption is flat as households smooth their consumption (as shown in [7]).

$$ca_t = \frac{CA_t}{Y_t} = \frac{\beta}{1+\beta}\left[-g^Y - \frac{1+\beta}{\beta}\frac{DEF_t}{Y_t} - \frac{1}{\beta}\frac{1}{Y_t}\left(G_t + \beta G_{t+1}\right)\left\{\frac{1+\beta}{1+\beta\left(1+g^Y\right)} - 1\right\}\right] \quad [20]$$

We start our analysis of the impact of changes in world interest rate and wedge between interest rate for which domestic economy can borrow at international financial markets with assumption that the subjective discount factor is equal to the product of world interest rate and the wedge. The impact of changes in discount factor is not direct as they do not represent the fundamental factors but rather indirect as they influence *how strong* the three fundamental factors (output growth, government deficit and public spending) will affect the evolution of current account. We start with discussing the impact of discount factor β on the following fundamental factors:

Output growth – as the first derivation of the following expression $\partial\left(\beta/(1+\beta)\right)/\partial\beta > 0$ is positive the change in β boosts the effect of output growth rate on the current account ratio. In other words, if the world interest rate decreases (increases) and/or wedge decreases (increases) the effect of output growth rate on current account ratio will be magnified (decreasing). In reality, with decreasing interest rates or decreasing risk premium for domestic households the domestic subjects are more likely to finance their needs in international financial markets. This situation will be also reflected in higher volatility of current account ratio caused by changes in output growth (domestic income).

Public spending – the impact of change in β depends on value of underlying parameter, more concretely on value of growth rate. In most of the cases[9] the increase in β (or decrease in world interest rate and/or decrease in wedge) boosts the effect of government spending on current account ratio. The easier is to finance domestic spending in international financial markets the more powerful is the impact of government spending on households' disposable income.

However, as pointed out in Obstfeld and Rogoff (1996) when the subjective time-preference rate and the market interest rate differ (with or without the wedge) the motivation to smooth consumption is modified by an *incentive to tilt* the consumption path. The effect of this *incentive to tilt* can be described in the following way.

Let us assume that the subjective discount factor β is lower than the market discount factor based on the world interest rate (with or without edge). In that case the domestic subjects require higher interest rate for giving up their current consumption than offered by financial markets and prefer current consumption over future consumption. This discrepancy transforms itself in current account deficit in period one.

The other line of reasoning would underline the role of international borrowing. With difference between required interest rate derived from discount factor and market interest rate domestic households can borrow from abroad for a lower interest rate to finance their current consumption as the market interest rate is not sufficiently high enough to persuade them to postpone their consumption to future. The strict differentiation between subjective domestic discount rate and discount rate based on market interest rate allows us to roughly determine the difference in current account deficit caused by that discrepancy.

3. Case Study – Eurozone Debt Crisis and Current Account Imbalances

Using the equation in [17[we would like to now turn our attention to investigation of the effects of integration in the Euro Area on the current account imbalances in general and later on by focusing on effects of current fiscal consolidation. Let us now briefly recall key implications of the equation in [17]: (1) government deficits affect current account balance in a negative way; (2) economic growth affects current account balance in a negative way[10]; (3) government spending lowers

[9] For example, for $\beta = 0.995$ and $g = 2.5$ the first derivative with respect to β is negative, thus increase in parameter leads to decrease in overall value of the expression, ceteris paribus. The exact threshold values can be derived from the first derivation of the following expression: $(1/\beta)(1/Y_t)\left(G_t + \beta G_{t+1}\right)\left\{(1+\beta)/\left[1+\beta\left(1+g^Y\right)\right]-1\right\}$.

[10] Even though not formally derived here by our educated guess supported by Blanchard and Giavazzi (2002) we would expect that the difference between domestic output growth rate and output growth rate of trade partners

disposable income of households and acts counter-cyclically on evolution of current account (dependable on the output growth rate); (4) positive (negative) difference between subjective discount factor β and discount factor based on market interest rate decreases (increases) current account deficit; (5) decline (increase) in wedge between world market interest rate and interest rate for borrowing in international financial markets affects current account deficit in negative (positive) way.

As pointed out by Blanchard and Giavazzi (2002) the establishment of monetary union in the late nineties has led to decrease in wedge between world market interest rate and interest rate for borrowing in international financial markets due to elimination of foreign currency risks and deepening of markets for specific instruments. Financial integration, additionally, has brought elimination of capital controls and other explicit barriers to capital flows, harmonization of financial market rules and increase in transparency of information flows. During the period 2001 up to 2012 this was mostly visible in case of Slovak republic, Slovenia, Malta and Cyprus. On top of that, other countries clearly benefited from the membership as their levels of interest rates had been kept close to the benchmark Euro Area interest rate until the crisis hit in 2007 (Greece, Ireland, Italy, Spain).[11] According to the implication of the model the convergence in interest rates to the countries with lowest interest rates should increase their current account deficits. On the exactly opposite side stands Germany and Luxembourg, for which the wedge has been moving even in negative numbers, thus pushing the current account balance upwards.

The second consideration is related to the difference between subjective discount factor and discount factor based on market interest rates. Data from Wang et al. (2010) suggest that for countries such as Greece (0.77) and Italy (0.78) the relatively low values for subjective discount factor accompanied by decreasing market interest rate for foreign borrowing (which in turn leads to increase in market discount factor) creates a discrepancy that shows itself in higher negative values for current account deficits. The sudden access to foreign capital not associated with increase in subjective discount factor the low costs for financing abroad can turns into current account deficits. On the other hand, countries (Austria, 0.85) with relatively high subjective discount factors can profit from their willingness to give up their current consumption and lend to other countries, situation that reflects itself in current account surpluses.

Let us turn our attention to the role of fiscal policy in creation of external imbalances. As apparent from the equation in [17] expansionary government policies in terms of increasing government expenditures should act counter-cyclically but only in the presence of positive output growth and vice versa. Looking at the real data for the Euro Area member countries we observe steady increase in government expenditures across entire Euro Area economic space.[12] Along with positive output growth in all cases the pressures arising from the fiscal policy operated in counter-cyclical direction. With drop in output growth rate that turned into negative numbers and drop in government spending (turn to the fiscal consolidation in the area of government expenditures) fiscal consolidation in total expenditures acted again as a counter-cyclical factor for current account balances and helped to decrease the degree of external imbalances within the Euro Area economic space.

The story of government deficits is the following one. The model in [17] predicts one-to-one relationship between fiscal deficits and current account deficits (as argued by the twin deficits hypothesis). In period of 2001 to 2005 three countries (Greece, Italy and Portugal) had increased their fiscal deficits before improvement in fiscal balances took place in 2006 and 2007. At this place it is necessary to stress out that the improvement in fiscal balances in years 2005 – 2007 was a Euro Area-

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should matter too. Incorporation of output growth rate of trade partners should be included in extended version of this paper.

[11] This observation is based on calculation of the financial wedge calculated by the following equation: $x = (1+r^D)/(1+r^*)-1$. As proxy variable for interest rate for borrowing we use long-term government bond yields for domestic r^D and Euro Area benchmark interest rate r^*. Benchmark interest rate for Euro Area is calculated as simple average of interest rates of three member countries with the lowest interest rates in particular year.

[12] To countries with the highest increase in government spending in nominal terms before the crisis belong Slovakia, Estonia, Luxembourg, Ireland, Cyprus and in some years Greece and Spain. The biggest fiscal consolidation measured as the highest percentage drop in total government expenditures after the 2007 happened in Ireland, Greece, Estonia and Spain.

wide phenomenon and should not be contributed to only some groups of countries as usually done (Germany or Finland as shining examples of working fiscal austerity). Exceptional times that occurred after the 2007 with year 2009 as the highest peak resulted in a significant worsening of fiscal deficits in almost all countries (with Estonia as an exception).

When we look at the evolution of current account balances and widening of gap between countries with current account surpluses and current account deficits the highest increase in external imbalances occurred between years 2004 and 2007. Intriguingly, these times were marked with lowering of fiscal deficits in almost all Euro Area countries (revenue-based fiscal consolidation as tax income rises due to positive output growth) – a factor that should lead to ***the decrease*** in external imbalances. Apparently, the widening of external imbalances in Euro Area economy was caused other factors than just the fiscal consolidation (revenue-based consolidation due to increase in tax income before crisis and expenditures-based measurements during the debt crisis): (1) private saving-investment decisions based on positive expectations with respect to output growth; and (2) convergence in interest rates accompanied with difference between subjective discount factor and market-based discount factor. Secondly, the current measurements taken with aim to stabilize public sector should lead to decrease in external imbalances as the cuts in expenditures in presence of negative output growth and decrease in fiscal deficits put positive pressure on current account balance.

4. Conclusion

Widening of external imbalance in the Euro Area economy has been subject to many theoretical and empirical studies. This paper would like to contribute to the debate by presenting an updated version of intertemporal model of current account with fiscal policy included for which the Ricardian equivalence does not hold. The model is an updated version of Roubini (1988) model with some features taken from the model by Blanchard and Giavazzi (2002). We use the model proposed to illustrate possible impacts of fiscal policy before the Euro Area debt crisis and after the fiscal consolidation measurements take place.

The main implications from the model derived in this paper can be summarized to the following bullet points: (1) government deficits affect current account balance in a negative way; (2) economic growth affects current account balance in a negative way; (3) government spending lowers disposable income of households and acts counter-cyclically on evolution of current account (dependable on the output growth rate); (4) positive (negative) difference between subjective discount factor β and discount factor based on market interest rate decreases (increases) current account deficit; (5) decline (increase) in wedge between world market interest rate and interest rate for borrowing in international financial markets affects current account deficit in negative (positive) way.

Applying the model on the history of Euro Area external imbalances we conclude that there are other factors than fiscal policy present that are likely to be a source of widening the gap in external imbalances in the Euro Area: (1) private saving-investment decisions based on positive expectations with respect to output growth; and (2) convergence in interest rates accompanied with difference between subjective discount factor and market-based discount factor. Empirical evidence supporting the claim that fiscal policy stood behind the external imbalances is not convincing as, in line with Blanchard and Giavazzi (2002), external imbalances seems to be a natural phenomenon caused by, among others, positive output growth expectations.

Future research in this area should focus on inclusion of other key factors (world growth rate, price differences, exchange rate, variable interest rate, tradable and nontradable goods etc.) into the basic model presented in this paper. As part of the robustness check different approaches to the specification of the government's optimization problem need to be tested. Additionally, empirical tests for validity based on VAR tests of standard intertemporal models are required.

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market in light of discrepancies between needs and possibilities of development of housing sector in Slovakia.

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