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Colombier, Carsten

FiFo - Institute for Public Economics, Federal Finance Department
Switzerland

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**How to consolidate government budgets in view of external imbalances
in the Euro area? Evaluating the risk of a savings paradox***

by

Carsten Colombier**

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**Dr. Carsten Colombier

Economic Analysis and Policy Advice
Federal Finance Administration
Bundesgasse 3
3006 Bern/ Switzerland
phone +41 31 322 6332
fax +41 31 323 0833
email carsten.colombier@efv.admin.ch

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Abstract

This paper contributes to the debate on the macroeconomic effects of fiscal consolidation. The analysis focuses on the western European countries of the EMU. In deviation to the relevant literature external imbalances are explicitly taken into account and the longer-term impact on productivity growth is analysed. This present paper provides evidence that austerity measures in the EMU have affected labour productivity growth adversely. Therefore, the view that fiscal contractions are expansionary in the longer run is rejected in the case of the EMU. In particular the results of this paper suggest that Euro area countries, which run a current-account surplus, should only start with austerity measures if a sustainable upturn sets in. Otherwise a negative spill-over for other EMU members is to be expected. As all Euro area countries cut their budgets simultaneously a savings paradox is likely. The latter may only be averted by either a fundamental change of fiscal stance in the current-account surplus countries such as Germany or if the current recovery in these Euro area countries boosts domestic demand in due time. Additionally in the past, the level of public debt in the EMU would not appear to have interfered with fiscal policy.

JEL codes: H6, E6, C1.

Key words: EMU, budget consolidation, fiscal policy, economic growth

1. Introduction

In the light of deteriorating public finances in the Euro area and increasing uncertainties on the stability of the Euro area several Euro area countries, for instance Greece, Spain, Italy and Portugal have announced tough measures such as spending cuts of salaries of public employees or increases of VAT to bring the budget into balance in the medium term. Nonetheless, it is not clear if these austerity measures prove successful. A purely 'thrift-based' consolidation strategy might lead to depressing economic growth and, paradoxically, to further worsening of public finances. This may cause a government savings paradox. As a consequence, a more growth-oriented consolidation strategy could be more effective. This is empirically analysed in this present paper.

For a growth-based strategy recent research findings lend some support. For instance, Colombier (2011) provides empirical evidence that the composition of government expenditure is crucial for economic growth. Therefore, governments should not crowd out growth-enhancing public expenditure items to improve the public budget in the short run. Otherwise, governments may put the medium-term improvement of public finances at risk. Apart from further empirical research, which supports the thesis of the new growth literature that public investments in infrastructure and human capital can enhance economic growth (e.g. Colombier, 2009), recent research suggests that fiscal stabilization policies can be conducive even to long-run growth if price rigidities and other market frictions are present (Galí et al., 2005; Aghion and Marinescu, 2006). However, a recent contribution by Reinhart and Rogoff (2009) comes to the conclusion that a debt-to-GDP ratio of above 90% can dampen economic growth in advanced countries. This can be due the fact that at a certain debt-threshold non-Keynesian effects set in. In this case private agents expect a decrease in interest rates due to a reduction of public debt, which spurs private investments. Thus, the problem of a possible savings paradox produced by an 'austerity-based' consolidation would be resolved. In contrast, recent simulations of New Keynesian models give evidence for the fact that optimal debt policies should not aim at a specific debt target as is laid down in the Maastricht treaty (Kirsanova et al. 2007).

In order to evaluate the risk of a savings paradox this paper carries out an empirical analysis on the growth impact of fiscal, including active stabilization, policies in the Euro area. We take government consumption and investment into account. In contrast to previous research in this area we include the external imbalances of the European Monetary Union (EMU). This is done because this reflects the divergent economic developments in the EMU. This study shows that fiscal contraction may exert an averted impact on economic growth in the longer term.

This paper is organised as follows. The following section provides a brief overview how austerity measures might impact economic growth. As a large part of the literature deals with the thesis of the so-called expansionary fiscal policy section 2 focuses on this issue. Section 3 outlines how the economies of the Euro area have diverged since the introduction of the Euro. Section 4 presents the theoretical model, on which the econometric analysis is based. In sections 5 the econometric method, which is applied in this paper is set out and the results of the estimations are presented before some conclusion are drawn in the closing part of this paper.

2. Possible impacts of austerity policy

Under the heading expansionary fiscal condition a vast amount of studies exists, which examines how expenditure cuts or tax increases might boost economic growth. This literature rests on the thesis that consumers and investors might react in non-Keynesian ways in response to budget cuts of the government. Conventionally, it is assumed that a contraction of government spending brings about a temporary slowdown of economic demand. This is a Keynesian view of the way austerity measures impact economic activity, at least, in the short term (see e.g. Afonso, 2006, 9). However, different channels of non-Keynesian effects are mentioned. The typical Ricardian view would be if cuts in government spending are perceived as long lasting, this implies a reduction in permanent tax burden so that the consumers are induced to spend more. Moreover, there is the so-called "expectational view of fiscal policy" (Blanchard, 1990; Summers, 1997). In the case of initially high levels of public debt private consumption might be increased if the attempt of the government to cut the public debt is viewed as credible by consumers. The latter may imply that

consumers expect that the uncertainty of future fiscal policy and the probability of dramatic tax increases are reduced. If the expectations are strong enough consumers decrease precautionary savings. Moreover, the risk premium of sovereign debt might be reduced so that overall lower interest rates crowd in private investments. This is in line with the empirical study by Reinhart and Rogoff (2009) who come to the conclusion that after the threshold a public-debt-to-GDP ratio of 90% non-Keynesian effects set in. In addition, Bertola and Drazen (1993) argue that the likelihood of fiscal consolidation efforts of the government keeps rising after certain debt level. When in this situation a fiscal consolidation occurs, this may foster expectations that the future tax burden will be lowered. Consequently, permanent income of consumers goes up. As a result, the probability of Ricardian behaviour of consumers could increase with the level of public debt to GDP. This would imply non-linear effects of fiscal policy.

However, Ricardian behaviour prerequisites that consumers are not liquidity constrained and capital markets are perfect.¹ But capital markets are characterised by market failure due to asymmetric spread information among market participants and risk of default and non-liquidity (Greenwald and Stiglitz, 1993). If neither perfect foresight nor perfect information is available consumers and investors may use rule of thumbs. This could reinstate the old Keynesian proposition as Galí (2005, 7) argues. For example, if uncertainty about the future employment or investment rises budgetary constraints is binding and consumers as well as investors are likely to hold back their money. As a result, the demand of liquidity rises from a Keynesian view point. The story is different from a Ricardian angle. From this point of view consumers save and investors are reluctant to spend because rising debt raises the uncertainty of future fiscal policy. Whereas under a Keynesian view a fiscal impulse could restore confidence, the effect would be right the opposite

¹ The Ricardian consumption hypothesis hinges on the following assumptions: i) consumers must live forever or each generation of a dynasty must maximise the utility of the dynasty, ii) capital markets are perfect, iii) future taxes and income is certain, iv) taxes are lump-sum and v) full employment (see e.g. Arestis and Sawyer, 2004, 70).

under a Ricardian view. But given the imperfections on the capital market Keynesian effects might be dominant in times of great uncertainty.

A further channel identified by authors who held the view of an expansionary fiscal contraction is the labour-market channel, or to be more precise, labour supply (Alesina and Perotti, 1997). What matters for this kind of expansionary effect of restrictive fiscal policy is the composition of the implemented measures. Alesina and Perotti (1997) discern two types of fiscal adjustment i) reducing the public deficit by cuts in social expenditure such as unemployment benefits and further social allowances and cuts in public sector wages, and ii) reducing the public deficit through increases in labour taxes and cuts in public capital spending. According to this view increases in labour market taxes causes unit labour costs to go up in unionised labour market, whereas reducing social allowances lowers unit labour costs. In addition, public infrastructure is viewed as conducive to economic growth so that a cutting of these expenditure may have a permanent adverse effect, This conclusion is supported by recent empirical evidence (e.g. Colombier, 2009 and 2011).

Consequently, the effects of a restrictive fiscal impulse may depend on the initial financial position of the government and the size and persistence of budgetary adjustments. The empirical evidence on the expansionary effects of fiscal contractions is mixed. For example, the well-known study by Giavazzi and Pagano (1996) find evidence for non-Keynesian effects of budgetary adjustments on private consumption for OECD countries in the period from 1976 - 1992. Others analyses such as Heylen and Everaert (2000) come only to inconclusive results as to OECD countries. As regards to EU countries also no clear-cut conclusion can be reached. Whereas Giudice et al. (2004) provide evidence for non-Keynesian effects on economic growth for 14 EU countries from 1990 to 2002, only little evidence of an impact on private consumption is ascertained by Afonso (2001) who studies a sample of 15 EU countries from 1970 to 2001, and by Weyerstrass et al. (2006) who study a sample of 9 EU countries for the period from 1970 to 2004.

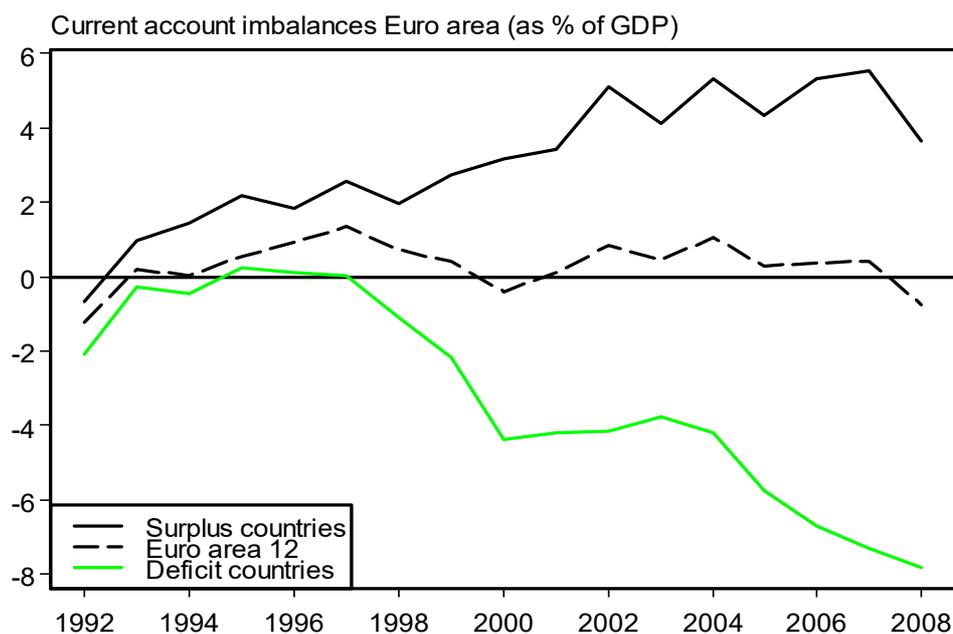
Furthermore, some empirical studies show that old-fashioned counter-cyclical Keynesian fiscal policy can prove beneficial even in the long-term given market imperfections. For example due to

macroeconomic fluctuations companies might be reluctant to invest in research and development (R&D) in a recession. This can be exacerbated by imperfect capital markets, for example, due to credit constrained companies. Aghion and Marinescu (2006) give empirical evidence that anti-cyclical fiscal policy mitigates the adverse impact of a recession on R&D expenditure. The conclusion can be drawn that under market imperfections stabilisation policy can have a positive impact on economic growth.

3. Growing imbalances in the Euro area and fiscal policy

More or less with the launch of the Euro as common currency in 1999 a diversion of current account balances within the Euro area can be observed. (see figure 1).

Figure 1: Current account imbalances in the Euro area from 1992 to 2008



Whereas Germany, the Netherlands, Belgium Austria and Finland have piled up current account surpluses during the European Monetary Union (EMU), southern European countries, in particular, Spain, Greece and Portugal, and Ireland have accumulated considerable current account deficits. As the overall external balances of the 12 old Euro are countries fluctuates around zero, these

imbalances reflect intra-Euro-area imbalances. This has not changed considerably through the crisis. However, prior to the crisis the external position of the main deficit countries Greece, Ireland, Portugal and Spain consists to a large extent of private sector deficits (see Bolliger et al., 2010, 8-9). In the crisis private savings rose sharply and due to stabilisation measures for the economy and the banking sector public deficits have soared. Consequently, after the crisis hit current account deficits are due to public deficits and not any more because of private sector deficits. But what are the origins of this development?

Usually, the story would go as follows. A country that starts from a lower level of economic development is expected to run external overdrafts because the country offers a lot of profitable investment opportunities and comparatively low labour costs. This leads to capital inflows and current account deficits. In the longer term productivity and wages go up so that investment inflows and the current account deficit diminish. The income of deficit and surplus countries should converge. But in the EMU convergence of per-capita income between surplus and deficit countries has been very modest (see Bolliger et al., 2010, 7). Moreover, disparities in terms of macroeconomic indicators such as GDP growth, unemployment rate and inflation rate have remained high or even widened (see Mathieu and Sterdyniak, 2007, 282). For example, the yearly average of the inflation rate in the Euro area country ranged between 0.7% in Germany to 3.9% in Ireland from 1999 to 2005 (see Mathieu and Sterdyniak, 2007, 287, Table 3). Similar macroeconomic policies, a common monetary policy conducted by the European Central Bank (ECB) and fiscal rules set by the Stability and Growth Pact (SGP) would seem to have contributed to this divergent development. Given this institutional setting the only way left to accommodate macroeconomic differences in a monetary union would be rather flexible wages and a very mobile labour force (see e.g. Dullien and Schwarzer, 2009, 156). However, the EMU does not fulfil these

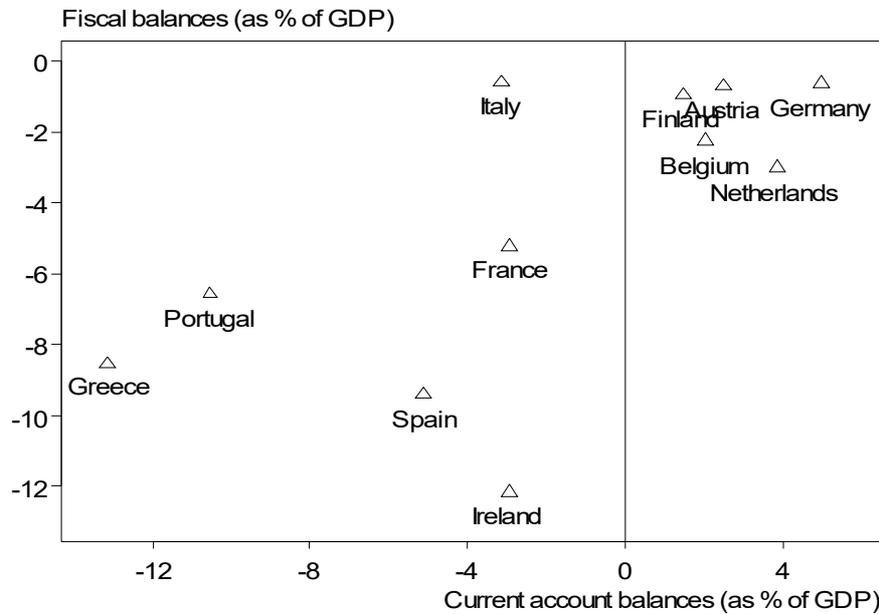
conditions due to language barriers and labour market institutions.² Therefore some authors argue that stronger coordination or centralisation of fiscal policies is needed to mitigate macroeconomic divergences among Eurozone countries (see Baldwin and Wyplosz, 2006, 358).

Consequently up to now, macroeconomic divergences among Euro area countries could neither be mitigated by macroeconomic policies nor by market forces. On the contrary, due to a common currency the ECB must pursue a one-size-fits-all monetary policy. But due to differing inflation rate differing real interest rates result. For example, rather low interest rates have nourished the housing bubbles in Spain and Ireland and unsustainable spending booms in Greece and Portugal (see Bolliger et al., 2010, 10). Germany, which lost competitiveness due to the re-unification has regained competitiveness by wage restraint, but at the expense of subdued domestic demand. Furthermore, empirical results show that in the run up to the EMU fiscal policies were pro-cyclical, probably, to meet the criteria of the SGP to join the EMU (Galí and Perotti, 2003; Dullien and Schwarzer, 2009). These studies provide empirical evidence that fiscal policy is a-cyclical since the start of the EMU. But Dullien and Schwarzer (2009, 160) provide further evidence that discretionary fiscal policy even counteracted the working of automatic stabilisers in the Eurozone. This confirms a critique of SGP which hints to the fact that on the one hand the 3%-deficit-limit can be too restrictive in a recession and on the other hand, the SGP offers no incentives for restrictive fiscal policies during an upturn (e.g. Colombier, 2005). Thus, fiscal policy coordination could be beneficial to achieve convergence in the Euro area.

The financial and economic crisis has not caused a considerable shrinking of external imbalances among Eurozone countries. In contrast, public deficits of countries, which run an external deficit, soar (see Figure 2).

² Some Keynesian authors argue that fully downward flexibility of wages is not desirable because it bears the risk of prolonging and deepening a recession by exerting deflationary pressure (e.g. Greenwald and Stiglitz, 1993a).

Figure 2: Fiscal and external imbalances in 2009³



Thus, several Euro area countries, in particular the countries with large current account deficits, have adopted severe austerity measures to restore confidence of investors. If these measures prove conducive to economic growth as is suggested by the camp of expansionary-fiscal "contractionists" these countries will gain in competitiveness and external imbalances could be reduced (see section 2). But surplus countries try also reducing budget deficits. As a result, the macroeconomic situation of countries with an external deficit may worsen further. As all countries save simultaneously, a saving paradox might arise. Therefore, countries with a current surplus such as Germany would be well-advised to pursue an expansionary stance to support the rebalancing of current accounts in the EMU: Moreover, if consumers and investors react in a Keynesian way a saving paradox within a country can occur. Though the government deliberately tries cutting the budget deficit it grows larger when the recession is prolonged. In this case it would be most suited to install austerity

³ Estimations of the European Commission, Ameco data base April 2010.

measures when the upturn sets in. In the following sections an empirical analysis of 11 Euro area countries is undertaken to provide evidence how marked contractions of fiscal policy impact labour-productivity growth and if this impact interacts with external balances and the currency union.

4. Theoretical model

In this section a theoretical model is outlined, which serves as a basis for the empirical estimations.

Supply side

Evidence given by empirical studies on the growth effect of fiscal policies suggests that publicly provided inputs impact economic growth (see e.g. Colombier, 2009, 910). Therefore, we assume a production technology for the economy, which includes a publicly provided input. Different specifications of publicly provided inputs are used in studies on endogenous growth. But Colombier and Pickhardt (2005, 279) show that only two specifications, the unpaid factor and the factor-augmenting public input, are theoretically tenable. In the following we suppose that the government provides a factor-augmenting public input (G) Empirical evidence suggests that in particular these two publicly provided inputs are growth-enhancing (see Colombier, 2009, 910). Apart from G, labour (L) and capital (K) are used to produce real output Y. B corresponds to the technology parameter. Assuming a Cobb-Douglas production function, productivity in real terms y , i.e. real output per worker, can be written as follows:

$$y = BG^\alpha k^{(1-\alpha)} \text{ with } k := K/L \quad (1)$$

Furthermore, the i -th profit-maximising firms face the following individual demand function (Y_i) under monopolistic competition among n technologically identical firm (see Dixit and Stiglitz, 1977, 249).

$$Y_i = \left(\frac{p_i}{p} \right)^{\frac{-1}{1-\theta}} \frac{Y^d}{n} \text{ with } 0 < \theta < 1; p := \frac{1}{n} \sum p_i; p_i := \text{price of } Y_i. \quad (2)$$

The individual demand of firm i depends on the price-elasticity of demand with respect to i , the relative price of firm i (p_i/p) and aggregate demand (Y^d). For example, if the elasticity parameter θ approaches one firms would face perfect competition. As to factor markets diverging assumptions are made. The labour market is assumed to be national, whereas capital markets are international. This seems to be intuitively plausible. As a result, the interest rate is exogenously given for the economy of an individual country. For the sake of simplicity, we assume that a national monopoly trade union sets the nominal wage rate of the economy of the respective country.⁴

The demand side can impact the supply-side equilibrium of our model economy under certain conditions, which is shown in the following. Taking account of equations (1) and (2) the aggregate profit (π) of all firms can be derived.

$$\pi = pB^\theta G^{\alpha\theta} K^{(1-\alpha)\theta} L^{\alpha\theta} Y^d(1-\theta) - wL - iK \rightarrow \max_{L,K} \quad (3)$$

with $w :=$ nominal wage rate; $i :=$ nominal interest rate

Note that due to monopolistic competition in the goods market individual firms set the prices p_i . Firms set the prices by choosing the amounts of labour and capital optimally. Moreover, firms are price-takers in the factor markets. Consequently, maximisation of equation (3) leads to the following well-known first order condition:

$$k = \frac{w}{r} \frac{1-\alpha}{\alpha} \quad (4)$$

From equation (1) along with equation (4) one can infer that aggregate demand does not impact real output under monopolistic competition as is shown by Blanchard and Kiyotaki (1987) in a

⁴ Against the backdrop of economic globalisation the assumptions that trade unions set the wage rate may not seem to be plausible. However, the introduction of a more realistic assumption concerning the labour market, i.e. some bargaining power of firms, would leave the nominal wage rate indeterminate in our model. Since modelling a bargaining processes over the wage rate would not change the key results of this present analysis, we abstain from using this option. Therefore, we stick to the simpler, albeit possibly more unrealistic assumption that a national trade union sets the wage rate.

general equilibrium framework. Thus under monopolistic competition and wage-taking behaviour of workers aggregate demand does not impact long-term output per worker. But this result changes if labour supply is unionised as is shown in the following.

The trade union maximises the following Blanchard-Kiyotaki (1987, 649p.) utility function subject to the aggregate labour demand function (L^d), which can be derived from the maximisation of π (see equation (3)): This implies that the trade union sets the equilibrium wage rate.

$$U = \frac{w}{p}L - \frac{\phi}{\sigma}L^\sigma \rightarrow \max_w \text{ s.t.}$$

$$L^d = B^{-1}G^{-\alpha}Y^d \left(\frac{r}{w}\right)^{1-\varepsilon} \left(\frac{\alpha}{1-\alpha}\right)^{\alpha-1} \frac{1}{1-\theta} \left[\theta \frac{p}{r} \frac{p}{w} (\alpha-1)\right]^{\frac{1}{1-\theta}} \quad (5)$$

$$L = L^d$$

with $\sigma \geq 1$

The trade union puts a positive weight on the sum of real wages, which is the first term on the rhs of equation (5), and leisure, which corresponds to the second term of the rhs of equation (5). The bargaining power of the trade union increases with an increase of σ . Subtracting one from σ results in the marginal disutility to work.

Maximisation of equation (5) yields the following labour supply function:

$$\frac{w}{p} = \left(\phi + \frac{1-\theta}{1-\alpha(1-\theta)} \right) L^{\sigma-1} \quad (6)$$

If k in equation (1) is substituted with the rhs of equation (4) and one solves labour supply (see equation (6)) and labour demand (see equation (5)) equations for the wage rate, the following supply-side equilibrium results.

$$y = \quad (7)$$

$$\left(G^{\alpha(X-p)} B^{X-p} \left(\frac{i}{p}\right)^{\frac{p\theta}{\theta-1} X(1-\alpha)} \underbrace{\left(\frac{1-\alpha}{\alpha}\right)^{(1-\alpha)(X-p) + \frac{p}{\theta-1}}}_{=c1>0} \right)^{\frac{1}{X}} \left[Y^d \underbrace{\left(\phi + \frac{1-\theta}{1-\alpha(1-\theta)} \right)^{\frac{\theta(\alpha-1)}{\theta-1}}}_{=c2>0} \left((1-\alpha)\theta \right)^{\frac{1}{1-\theta}} \right]^{\frac{p}{X}}$$

=

$$\left(c1 * G^{\alpha(\chi-\rho)} B^{\chi-\rho} \left(\frac{1}{p} \right)^{\frac{\rho\theta}{\theta-1} - \chi(1-\alpha)} \right)^{\frac{1}{\chi}} (c2 * Y^d)^{\frac{\rho}{\chi}}$$

with $\chi(\alpha, \theta, \sigma) > 1$; $\chi_\alpha > 0, \chi_\theta < 0, \chi_\sigma > 0$; $\lim_{\theta \rightarrow 1} \chi \rightarrow -\infty$;

$\rho(\alpha, \sigma) > 0$; $\rho_\alpha < 0, \rho_\sigma > 0$; $\chi \gg \rho$; $\chi(1 - \alpha) > \rho$; $c1$ and $c2$ are constants.

Equation (7) implies that under imperfect competition ($\theta \neq 1$) and unionised labour supply output per worker, i.e. labour productivity, is affected by aggregate demand (Y^d).⁵ Furthermore, equation (7) shows that under perfect competition, i.e. $\theta \rightarrow 1$ and $\chi \rightarrow -\infty$, aggregate demand would not impact labour productivity. Thus, both, imperfect competition and wage-setting behaviour of a trade union in the labour market must be fulfilled for producing output effects of aggregate demand in our model. But one should bear in mind that further reasons for output effects of aggregate demand can be relevant, which are not included in our model. In particular, due to market failures such as asymmetric information and uncertainty about the future long-term output effects of aggregate demand might result (see section 2). Thus, the demand side can impact productivity in the short as well as in the long run. The view that demand can affect the long-term position of an economy is held by macro-economists who either think that it takes quite a long time before a long-term equilibrium is reached after a shock, parts of financial New Keynesians (e.g. Greenwald and Stiglitz, 1993) or think that market economies are inherently unstable, the Post-Keynesians (e.g. Hein, 2004).

We introduce the openness of the economy through the equation of the demand side, which is:

⁵ This should come as no surprise since we assume a monopoly trade union, which is tantamount to having wage rigidity in the labour market. Blanchard and Kiyotaki (1987, 655pp.) show that given a general equilibrium model price rigidities can explain why aggregate demand movements generate output effects.

$$Y^d = f\left(c, t, G, C_G, \frac{i}{\frac{p^a}{p}}, \gamma\right) \text{ with } \gamma = \frac{p^a}{p} e, \quad (8)$$

For simplicity we do not differentiate between current-account and trade balances in equation (8). As a result, domestic aggregate demand Y^d depends on the real exchange rate, γ , but not on the ratio between the foreign and domestic interest rate. Thus, we assume the comparative form of purchasing power parity. Since the focus of this paper is the European Monetary Union (EMU) it is reasonable to assume a common nominal interest rate, i , across countries in the EMU. Additionally, we assume that the nominal interest rate, i , is controlled in the short term by the central bank, i.e. the European Central Bank (ECB). Since inflation differs across countries, countries have differing real interest rates. One of the reason why the real interest rate r may adversely affect demand can be due to Ricardian consumers. The propensity to consume, c , in equation (8) reflects Keynesian consumption. Demand is positively related to c . Moreover, foreign demand (Y^a) impacts demand through exports. Furthermore, the average tax rate, t , exerts a negative impact on demand. The impact of public investment, G , and consumption C_G , depends on the fact whether Ricardian consumption outweighs Keynesian consumption or vice versa. Nevertheless, an increase in government expenditure and a decrease of the average tax rate may exert a negative impact on net exports. Equation (8) is consistent with the assumption that private investment behaviour depends negatively on interest rates and positively on an output variable, such as expected demand.

Since this paper analyses how austerity measures impact economic growth, we take logarithms and first differences of the right-hand side of equation (7). Furthermore, we substitute the first differences of aggregate demand, Y^d , by the growth rate of the demand function in equation (8).⁶ These transformations lead to the following equation:⁷

⁶ Note it is supposed that neither the parameters α and θ nor the propensity to consume change over time. In addition, the output effects o changes in tax rates is not analysed.

⁷ As usual the growth rates of variables are dubbed \hat{y} etc.

$$\hat{y} = \frac{1}{\chi} \left((\chi - \rho) \hat{b} + (\rho \eta_G + \alpha(\chi - \rho)) \hat{g} \right) + \frac{1}{\chi} \left(\left(\rho \left(\frac{\theta}{1-\theta} + \eta_r \right) - \chi(1 - \alpha) \right) \hat{r} + \rho(\eta_Y \hat{y} + \eta_{C_G} \hat{C}_G + \eta_{Y_a} \hat{Y}_a) \right) \quad (9)$$

η_j (j := demand side variable) depicts the elasticity of aggregate demand, Y^D with respect to the diverse factors of demand such as government consumption, C_G , or the real interest rate, r (see equation (9)).⁸ According to equation (9) the growth rate of productivity, \hat{y} , are driven by supply-side as well as demand-side drivers. Equation (9) serves as a basis for our estimations, which are outlined in the following sections.

5. Econometric analysis

5.1 Method and data

The sample, which is used for the estimations, consists of 11 developed Euro area countries within the time period from 1980 to 2008 (see Appendix). As data has not been available across all countries for the entire time period the panel is unbalanced. In contrast to the usual procedure to analyse the effects of austerity policies we do not distinguish between short-run and long-run effects (see e.g. Afonso, 2006, 16). This is done for two reasons. Firstly, to distinguish between short- and long-run effects a panel error-correction model should be used. Necessarily, the variables applied to the estimations should be integrated of order one. However, as to unit roots the results in a panel-data framework seem to be inconclusive (see e.g Afonso, 2006, 20). Secondly, the view that a fiscal consolidation is conducive to the long-run performance of the economy is more contested than the view that austerity policies generate short-term output losses. As outlined in section 2, a

⁸ Usually, η would be referred to as a short-run elasticity. Nonetheless, if under imperfect competition a long-term impact would be exerted by the demand side, dubbing η as short-run would be inadequate. Therefore, we prefer naming η demand elasticity.

considerable part of the literature subscribes to the view that austerity measures are conducive to long-term growth. For these reasons we concentrate on the longer-term impact of fiscal policies.

To capture the notion of the longer term I use five-year moving averages of the data. Using five-year moving averages is done to avoid the choice of a special period (see Colombier, 2009, 901). An objection against the usage of smoothed is simply that in practice we do not know where the long-term path of economic might lead and it can only be exact by chance. Since our focus is on the longer-term in deviation to most other studies in this field we do not choose private consumption per capita but real GDP per worker as the dependent variable (e.g. Giavazzi and Pagano, 1996). In addition, this is in according with our theoretical model presented in the previous section.

Based on equation (6) the basic stochastic equation can be written as follows:

$$\Delta \text{ real GDP per worker } (t)_i = \sum \beta_j \Delta X_{j,i}(t) + \sum \beta_h \Delta Z_{h,i}(t) + u_i(t) \quad (10)$$

with: $u_i(t) = \mu_i + e_i(t)$

where i stands for country i and $i = 1, \dots, 11$, t represents time and $t = 1980, \dots, 2008$, β_j represents the coefficient of the macroeconomic variable X_j and β_h represents the coefficient of the fiscal variable Z_h . Macroeconomic regressors include private investment, the real short-term interest rate as a proxy for monetary-policy and the ratio of the nominal to the real exchange rate. As figure 1 shows the Euro area can be regarded as an domestic economy due to the fact the current account balances of the Euro area have been almost balanced from 1992 to 2008. Therefore, we choose as a proxy for foreign demand the real GDP of the US. This indicator can be viewed as export demand for the whole area, but also for individual countries. Moreover, a proxy for the labour force is included in the estimations. Fiscal data represent the general government level. They include real public investment per capita and real public consumption per capita,. Thus, in contrast to the common practice of using public expenditure ratios in terms of nominal GDP, public expenditure variables are expressed in real per capita terms. Proceeding in this way is justified by the fact that public expenditure ratios in terms of nominal GDP may have a negative correlation to GDP due to

the following reversed causality problem, namely, that public expenditures are budgeted on the basis of GDP forecasts. Experience has shown, however, that GDP growth rates are overestimated in the case of an economic downturn, whereas the opposite is true in an economic upswing. This can establish a negative relationship between public expenditures and economic growth.

Unobserved time effects are not taken into account since we introduce several dummies to consider different economic episodes of Euro area countries. Firstly, a dummy for the period before the introduction the Euro and after the introduction of the Euro is added to the estimations. Furthermore, a dummy is included that takes different external positions of Euro area countries into account.⁹ The ratio of net exports to nominal GDP serves as a proxy for the external position of a country. Also, a dummy which indicates fiscal episodes of austerity policy in Euro area countries is taken into account. Crucial for the choice of fiscal episodes characterised by austerity is the way fiscal adjustments are measured. Usually, this is done by measuring an improvement of the primary cyclically-adjusted budget balance of the government. For example, according to Giavazzi and Pagano (1996) a fiscal adjustment which can be defined as austerity measure is implemented if either the primary cyclically adjusted budget balances is improve by at least 2 percentage point in a single year or at least 1.5 percentage points on average in two years. This kind of approach is criticised because fiscal episodes are defined in an ad-hoc manner (see Afonso, 2006, 14). Therefore, Afonso (2006, 14) uses the statistical distribution of the primary structural budget balance to determine episodes of fiscal consolidation. Then, austerity measures depend on the size and an arbitrarily chosen multiple of the standard deviation. On top of this, substantial

⁹ Note that a dummy variable is applied due to a practical reason, As a country's external position is necessarily given by a balance, such as the trade balance, it does not make sense to calculate five-year averages to eliminate short-run fluctuations. Moreover, using a dummy variable for the external position of Euro area countries seems to be rather well-suited due to the following reasons: i) the external positions of the Euro area are rather sustained, ii) fluctuations around balanced external position are merely observable so that, overall, one should be able to savely rule out short-term fluctuations.

improvements in the primary structural budget balance may reflect budget cuts inadequately. For example, Ireland introduced sharp spending cuts and tax hikes amounting to 2% of GDP in 2009. But due to plummeting housing prices the primary deficit actually increased (IMF, 2010). By the same token, Japan worsened its budget balance by a one-time capital transfer amounting to 4.8% of GDP to the railways in 1998. In the following year the primary structural budget balance improved markedly without any austerity measure taken by the Japanese government. To avoid these difficulties we adopt another approach by concentrating on spending cuts. Though due to the neglect of tax increases this can be viewed as one-sided, one can argue that austerity policies are more often than not accompanied by sharp spending cuts. Fiscal austerity is identified by running a simple one-sample t test on the first difference of the ratio of total government spending to GDP. According to this test, the average reduction of public expenditure is statistically different from zero at a one-percent level (see Appendix). In order to define an austerity policy we take the upper limit of the 95 confidence interval of the t test. According to the latter, a reduction in public expenditure is significant if the government reduces spending by at least 1 percentage point of GDP in a single year. Based on this definition the dummy of austerity measures is constructed.

Equation (7) represents an error-component model so that the error term can be decomposed into unobserved country effects, denoted by μ_i and a remainder error term $e_i(t)$. All variables are expressed in logarithms. Apart from the exchange-rate, private and public investment all variables are estimated in first differences. As the countries of the underlying sample are chosen deliberately estimations of equation (7) are performed by applying a static one-way-fixed-effects model. By doing this, we use Arellano's version of White's covariance estimate, which is robust against serial correlation and heteroscedasticity (see Baltagi, 2008, 16). In addition, we carry out instrumented regressions to deal with endogeneity or reversed causation. As instruments we use the lags of regressors. The relevance of the instruments is evaluated by applying the non-parametric Spearman's rank correlation. If a lagged variable is at least correlated by 80% with the contemporaneous variable, the instrument is viewed as relevant. Since we use only a single

instrument for each variable an application of an over-identifying restriction test, e.g. Sargan's test, is not possible. So we do not test the validity of an instrument.

5.2 Results

In the following the results of our estimations regarding the impact of austerity policies and current account balances on the labour productivity growth are shown.¹⁰ The adjusted R^2 ranges from 34% to 51%, which is quite reasonable for panel data models (see Tables 1 and 2). It averages 44%. We carry out regressions based on the theoretical model as shown in equation (9). Moreover, to test the sensitivity of results we run further estimations including an additional regressor, the unemployment rate. Overall, the regressions suggest no marked difference between regressions with and without the unemployment rate. At first turning to the regressions in Table 1 one can observe that out of the macroeconomic variables only the unemployment and the real exchange rate show a statistical significant coefficient. The result of the exchange rate would appear to be unstable as the statistical significance coefficient moves across the regressions. However, applying instrumented regressions confirms that the real exchange rate impact labour productivity growth adversely. Thus, although some Euro area countries, in particular Germany, could depreciate their real exchange rate through wage restraint they did not benefit from higher productivity growth. As a consequence, the boost in exports through a devaluation of the real exchange rate does not seem to have compensated for sluggish domestic demand in the past.

*** Insert Table 1 about here***

The results concerning the exchange rate along with the result that the GDP of the US does not impact productivity growth of the Euro area countries suggests that the principle trading partners of the Euro area countries lie within the Eurozone. Nonetheless, the coefficient of the US-GDP indicates a positive correlation to productivity growth of the Euro-countries in all regressions though the coefficient is not significant. From the results of the fiscal variables one can draw rather

¹⁰ Note that further regressions, in particular with tax variables and interactions between fiscal and dummy variables, should be carried out.

clear-cut, albeit surprising, results. Whereas the estimations suggest that public consumption is conducive to growth we do not find a statistically significant impact of public investment. This may be due to the well-known fact that the definition of public consumption in the systems of national accounts does not correspond to the economic definition. In particular, government spending on human capital accumulation and research are regarded as public consumption. Moreover, rather than the flow the stock of public capital might be vital for productivity growth. The same reasoning can also be applied to the private-investment. Finally, the results concerning the public expenditure variables are confirmed by the instrumented regressions (see Table 2).

*** Insert Table 2 about here***

As regards the relevance of fiscal austerity, the current-account balance and the introduction of the Euro, the outcome of the estimations are remarkably stable. The majority of regressions in Table 1 and Table 2 suggest that independently from external balances the EMU austerity measures put a drag on productivity growth.¹¹ Nonetheless, if a country runs an external deficit in the EMU the effect of a sharp spending cut on productivity growth is either slightly positive, 0.1 percentage points if public expenditure is reduced by 1% of GDP (see table 1, last column) or modestly negative (see table 2, last column). Thus at first sight, consumers seem to behave in a Ricardian manner in Euro area countries, which face a current account deficit. However, in the run-up of the financial crisis the economies of deficit countries of the Euro area have grown rapidly. Thus, these spending cuts relate to spending cuts in a boom period. Therefore, expectations of consumers and investors should have been intact. Consequently, the tentative conclusion can be drawn that overall consumers and investors behave more in a Keynesian than a Ricardian way in the deficit countries. The regressions indicate a more pronounced decrease of productivity growth in response to a

¹¹ Note that if, for instance, austerity measures are adopted if a country runs current account surplus and takes account of the period of the Euro one has to add up the statistically significant coefficients of the respective dummies and the interaction terms in tables 1 and 2. For example according to the results of the second regression shown in table 1, the overall effect of austerity measures amounts to -0.017.

contraction of fiscal policy countries, which run a current account surplus (see table 1 and 2, 3rd and 4th column). Depending on the regression, one can infer that a fiscal contraction that amounts to 1% of GDP can decelerate productivity growth by 0.2 to 2 percentage points. These results point to Keynesian effects of fiscal contraction in Euro area countries, which run a current account surplus.

6. Conclusion

This present empirical analysis provides evidence that if governments in the Euro area countries introduce belt-tightening fiscal policies, as has been done in the aftermath of the financial crisis the Eurozone runs the risk of a Keynesian savings paradox. The estimations suggest that the Keynesian consumption hypotheses might better fit the data than the Ricardian hypothesis. Therefore, non-Keynesian behaviour would appear not to have been dominant in the EMU. However, a caveat might be that in times of high public debt such as in the post-crisis period consumers tend to behave in a non-Keynesian manner as they expect sharp tax rises in the future. But crisis and post-crisis levels of demand for liquidity and close substitutes of liquidity such as precious metals has exceeded pre-crisis levels by far, which indicates a typical Keynesian liquidity trap. This seems to confirm the hypothesis that growing uncertainty give rise to Keynesian behaviour.

According to the results of this present analysis, an optimal timing for adopting austerity measures would be during the course of an upturn. However, widening interest-rate spreads on government bonds among Euro area countries due to rising uncertainties in the financial markets in Spring 2010 but also conditioned credit lines from the International Monetary Fund and the European Union taken out by Greece and later on by Ireland has forced, Euro area countries such as Spain, Greece, Ireland, Italy and Portugal to adopt sharp budget cuts. Therefore, as a second-best solution Euro area countries, which run a current-account surplus, would mitigate the slump in demand in the Euro area by postponing restrictive measures until a sustainable upturn sets in.

But also governments of current account surplus-countries such as Germany have implemented budget cuts. Therefore, to avert a probable longer-term stagnation of the Euro area the recovery of the

surplus countries, in particular Germany, should boost domestic demand. Nonetheless, risks from financial and commodity markets are still looming large so that the upturn in a few Euro area countries, in particular in Germany, which has begun in 2010, might end as abrupt as it has set in.

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Appendix

Data

All data stem from the Ameco database of the European Commission, version 20th April 2010 (see http://ec.europa.eu/economy_finance/db_indicators/ameco/ziped_en.htm). The sample includes the following Euro area countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal and Spain. Luxembourg, which is also a western European country in the Eurozone has not been included because its population is much smaller than the smallest country of the sample, Ireland (4.4 million inhabitants Luxembourg: 450000 inhabitants). All estimations are carried out with the statistical software R 2.11.1. For this the R packages MASS, dynlm, plm and lmtest are applied.

t-test on first differences of reductions in the ratio of total government spending to GDP

One Sample t-test

$t = -10.7768$, $df = 104$, $p\text{-value} < 2.2e-16$

alternative hypothesis: true mean is not equal to 0

95 percent confidence interval:

-0.01498770 -0.01032915

mean: -0.01265843

Table 1: Austerity policy, current account imbalances and labour productivity growth in the Euro area

Model	One-way fixed-effects 5-year moving averages				
Dependent variable	Real GDP per worker				
Period	1980 - 2008				
Dummy current account	Surplus	Surplus	Surplus	Surplus	Deficit
Private investment ratio	0.020 (0.023)	0.010 (0.018)	0.009 (0.016)	-0.006 (0.011)	-0.006 (0.011)
US real GDP	0.070 (0.077)	0.101 (0.084)	0.058 (0.064)	0.080 (0.079)	0.080 (0.079)
Real exchange rate	-0.121 (0.080)	-0.103 (0.074)	-0.091 (0.095)	-0.136* (0.072)	-0.136* (0.072)
Real public investment per capita	0.002 (0.006)	-0.001 (0.004)	-0.003 (0.005)	-0.002 (0.004)	-0.002 (0.004)
Real public consumption per capita	0.147** (0.070)	0.139* (0.073)	0.127* (0.067)	0.159** (0.068)	0.159** (0.068)
Short-term real interest rate	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.002)	-0.002 (0.001)	-0.002 (0.001)
Unemployment rate	0.0124* (0.007)	0.010* (0.006)			
Austerity dummy (AUST)	-0.007** (0.003)	-0.017*** (0.003)	-0.007* (0.004)	-0.020*** (0.005)	-0.00019 (0.0007)
Current-account dummy (CA)	-0.002 (0.002)	-0.005** (0.002)	-0.001 (0.006)	-0.001 (0.002)	0.001 (0.002)
Euro area dummy (EA)	-0.002 (0.002)	-0.006** (0.003)	-0.004** (0.002)	-0.003 (0.004)	-0.005*** (0.001)
AUST * CA		0.017*** (0.003)		0.020*** (0.005)	-0.020*** (0.005)
AUST * EA		0.017*** (0.003)		0.020*** (0.003)	-0.002** (0.001)
CA * EA		0.006** (0.003)		-0.003 (0.004)	0.003 (0.004)
AUST * CA * EA		-0.023*** (0.004)		-0.023*** (0.004)	0.023*** (0.004)
Adj. R ² (as %)	39	46	34	45	45
Breusch-Godfrey test	106*** (0.0)	80*** (0.0)	108*** (0.0)	88*** (0.0)	88*** (0.0)
No. of countries	11	11	11	11	11
No. of observations	196	196	196	196	196

Notes: Estimation technique: Within-estimator using Arellanos's HAC-estimator to deal with autocorrelations and heteroscedasticity; apart from dummies all variables are in logarithms; except for dummies, exchange rate and investment data variables are first differenced; heading current account "surplus" indicates that dummy current account selects only CA-surplus data points and v.v.

***:= 1% significance level; **:= 5% significance level; *:= 10% significance level.

t-tests: figures in parentheses are SE; Breusch-Godfrey test on serial correlation, H0: no serial correlation, chi-square statistic.

Table 2: Austerity policy, current account imbalances and labour productivity growth in the Euro area - instrumented regressions

Model	One-way fixed-effects 5-year moving averages				
Dependent variable	Real GDP per worker				
Period	1980 - 2008				
Dummy current account	Surplus	Surplus	Surplus	Surplus	Deficit
Private investment ratio	0.014 (0.022)	0.0004 (0.016)	0.003 (0.018)	-0.014 (0.010)	-0.014 (0.010)
US real GDP	0.059 (0.084)	0.094 (0.100)	0.029 (0.070)	0.068 (0.091)	0.068 (0.091)
Real exchange rate	-0.142* (0.075)	-0.137** (0.064)	-0.151* (0.077)	-0.205*** (0.046)	-0.205*** (0.046)
Real public investment per capita	0.005 (0.005)	0.00003 (0.003)	-0.002 (0.005)	-0.002 (0.003)	-0.002 (0.003)
Real public consumption per capita	0.178*** (0.068)	0.127** (0.064)	0.082 (0.065)	0.111* (0.061)	0.111* (0.061)
Short-term real interest rate	-0.001 (0.001)	-0.0008 (0.001)	-0.001 (0.002)	-0.0003 (0.001)	-0.0003 (0.001)
Unemployment rate	0.014* (0.007)	0.009** (0.004)			
Austerity dummy (AUST)	-0.007* (0.003)	-0.021*** (0.005)	-0.008 (0.005)	-0.032*** (0.005)	-0.0005 (0.0006)
Current-account dummy (CA)	-0.002 (0.005)	-0.006*** (0.002)	-0.001 (0.002)	-0.002 (0.002)	0.002 (0.002)
Euro area dummy (EA)	-0.002 (0.001)	-0.007*** (0.002)	-0.005*** (0.002)	-0.004 (0.004)	-0.005*** (0.001)
AUST * CA		0.021*** (0.002)		0.031*** (0.005)	-0.031*** (0.005)
AUST * EA		0.021** (0.004)		0.036*** (0.005)	-0.002** (0.001)
CA * EA		0.006** (0.003)		-0.001 (0.004)	0.001 (0.004)
AUST * CA * EA		-0.027*** (0.004)		-0.037*** (0.005)	0.037*** (0.005)
Adj. R ² (as %)	39	49	38	53	53
Breusch-Godfrey test	101*** (0.0)	73*** (0.0)	72*** (0.0)	51*** (0.0)	51*** (0.0)
No. of countries	11	11	11	11	11
No. of observations	193	193	185	185	185
Spearman's rank correlation (as %)	Private investment (lag 2): 89; public investment (lag 4): 83; public consumption (lag 1): 89; unemployment rate (lag 1): 98				

Notes: Estimation technique: Within-estimator using Arellano's HAC-estimator to deal with autocorrelations and heteroscedasticity; apart from dummies all variables are in logarithms; except for dummies, exchange rate and investment data variables are first differenced; heading current account "surplus" indicates that dummy current account selects only CA-surplus data points and v.v.; Baltagi's (2008) instrumental variables estimator; lagged variables as instruments; to avoid invalid instruments only lagged variables having a Spearman's rank correlation of at least 80% with current variable are chosen.

***:= 1% significance level; **:= 5% significance level; *:= 10% significance level.

t-tests: figures in parentheses are SE; Breusch-Godfrey test on serial correlation, H0: no serial correlation, chi-square statistic.