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Government balance-consistent economic growth rates and their implications: A study of the euro area countries

Charalambos Pattichis[a]*

[a] York Business School, York St John University, York, United Kingdom

* Corresponding author at: c.pattichis@yorksj.ac.uk

Abstract. Using the model derived by Bajo-Rubio (2014), this paper estimates government budget balance-consistent growth rates for the euro area countries. A comparison of these estimates to their actual growth rates indicates that most of these countries are growing at rates that are very similar to their government balance-consistent growth rates. This finding implies that many euro area countries would not be experiencing excessive imbalances in their government budget over the long-run that could harm future economic growth. The analysis has also shown that for many euro area countries, the predictions of the model seem to be broadly consistent with their actual fiscal experience.

1. Introduction

In a recent paper, Bajo-Rubio (2014) has shown that Thirlwall's law (Thirlwall, 1979) can be extended to derive the economic growth rate that is consistent with equilibrium between any two variables, e.g. between government revenue and government expenditure. Thirlwall's law has long been used to estimate an economy's balance of payments-constrained growth rate (see Thirlwall (2011) for a discussion and a review of some studies using the law). However, there do not seem to have been any studies done to calculate government budget balance-consistent growth rates.

The aim of the present paper is to address this gap in the literature by investigating whether the euro area countries are growing at rates that are consistent with a balanced government budget and to discuss the resulting policy implications from the analysis. Using the model derived by Bajo-Rubio (2014), this paper estimates government budget balance-consistent growth rates for the euro area countries and then compares these estimates to the actual growth rates of these economies. This comparison enables conclusions to be drawn as to whether government deficits may pose a threat to the future growth prospects of these countries. As the next section argues, this threat arises in various ways but also from the fact that a country may need to take corrective measures to tackle any persistent and excessive budget deficits, as the resulting increases in government debt cannot continue indefinitely without leading to a future fiscal crisis. These corrective (contractionary) measures may, therefore, have a negative impact on future economic growth. The approach taken by this paper is that if countries are growing at rates that are similar

to their government budget balance-consistent growth rates, such negative effects on growth would be avoided. Another aim of this paper is to investigate the predictions of the model and how they relate to the actual experience of these countries.

In summary, the main results and implications of the analysis are: (a) The majority of euro area countries are growing at rates which are very similar to their government balance-consistent growth rates. This suggests that many of these countries would not be experiencing excessive imbalances in their government budget over the long-run and, therefore, there would be no need to take significant corrective measures that could harm future economic growth; (b) For many countries in the sample, the predictions of the model seem to be broadly consistent with their actual fiscal experience; and, (c) For those countries whose budget deficit may pose a serious threat to future economic growth, this paper discusses ways to reduce their government balance-consistent growth rate.

The remainder of this paper is organised as follows. The next section focuses on the effects of budget deficits, while section 3 explains the theoretical model and research approach. Section 4 presents and discusses the data, results and their implications while section 5 checks the robustness of the results. The last section offers some concluding remarks.

2. The effects of budget deficits

The empirical literature on the effects of budget deficits on economic growth is extensive. It is not the aim of this paper to provide an extensive review of this literature as the present paper is employing a different theoretical approach (which is discussed in the next section). As far as it can be ascertained, there are no other empirical studies that have employed the same approach as the present paper. Thus, the discussion in this section is intended to highlight the importance of studying this topic by noting the likely effects of budget deficits on economic growth with some results from the literature.

Budget deficits may affect economic growth in various ways. There is, for example, a huge literature analysing the effects of budget deficits on interest rates, see amongst others, the studies of Laubach (2009), Kameda (2014), and Cebula (2018). The theoretical argument here is that higher budget deficits may increase interest rates as the government tries to finance the deficit with increased borrowing. In addition, higher budget deficits may increase consumption and reduce national saving, thus, leading to a rise in interest rates. The resulting higher interest rates may crowd-out private investment, reduce the capital stock and, hence, reduce long-term economic growth. Thus, any short-run positive effects on consumption and growth via Keynesian multiplier effects may be eliminated in the long-run.

Furthermore, economic theory suggests that budget deficits may be inflationary if, for example, they are financed by an increase in the money supply. For example, studies by Jalil *et al* (2014) and Ahmad and Aworinde (2019) found that budget deficits are indeed inflationary. On the other hand, Catão and Terrones (2005) have investigated this issue for various groups of countries and have reported that budget deficits increase inflation in developing countries and in countries with

already high inflation but do not in the case of advanced countries with already low inflation. Similarly, Lin and Chu (2013), using panel data for 91 countries over 47 years, looked at episodes of low, middle and high inflation and have found that budget deficits increase the inflation rate in the latter two episodes; however, in the case of low-inflation episodes, they have reported a weak impact of budget deficits on inflation.

Another possible negative effect of higher budget deficits is that they can lead to higher current account deficits (the twin deficits hypothesis), see for example, the evidence presented by Forte and Magazzino (2013) and Trachanas and Katrakilidis (2013). This negative effect on the current account deficit may come about via the various consequences of budget deficits discussed above. For example, if budget deficits increase interest rates, the resulting increase in financial inflows will cause an exchange rate appreciation with negative effects on the current account deficit. Furthermore, if budget deficits lead to inflation, the resulting loss in competitiveness will also increase the current account deficit. In addition, if budget deficits lead to an increase in private consumption, the current account deficit will increase as expenditure on imported goods is likely to increase.

The literature investigating the effects of budget deficits on economic growth is voluminous and shows mixed results. Cebula (1995), for example, has investigated the effect of US budget deficits on US economic growth and has found a negative effect. In contrast, the results of Taylor et al. (2012), using US data from 1961-2011, suggest that higher budget deficits increase economic growth. Adam and Bevan (2005) found that reducing the budget deficit to around 1.5% of GDP enhances growth (but any further reduction does not). Castro (2011) has investigated the effect of the fiscal rules of the European Union on growth and did not find a negative effect. Finally, Lau and Yip (2019) have analysed the effect of budget deficits on the economic growth of ASEAN countries both before and after the Global Financial Crisis and have reported that budget deficits had a negative effect before the crisis but a positive effect after it.

3. Theoretical model and research approach

In a recent paper, Bajo-Rubio (2014) has shown that Thirlwall's law (Thirlwall, 1979) can be generalised to calculate the growth rate that is consistent with an equilibrium between any two variables. Focusing on the government budget balance, where the relevant economic variables are government revenue (T) and government expenditure (G), Bajo-Rubio (2014) has shown that the rate of economic growth that is consistent with a balanced budget is given by equation (1) below:

$$\hat{y}_{gb} = \dot{g} / e_{ty} \tag{1}$$

In equation (1), $\hat{y}_{gb}$ is the *government balance-consistent growth rate* (i.e. the rate of growth of an economy that is consistent with a balanced government budget), $\dot{g}$ is the rate of growth of government expenditure, and e_{ty} is the income elasticity of tax revenues (a measure of the responsiveness of tax revenues to a change in national income).

In deriving equation (1), Bajo-Rubio (2014) assumes that initially G=T and, therefore, equation (1) shows that the budget balance will be maintained if the growth rate of government expenditure is equal to the growth rate of government revenue, with the latter growth rate estimated in the model as ($\hat{y}_{gb}$ times e_{ty}). Equation (1), therefore, shows the rate of economic growth consistent with the equality of government revenue and government expenditure. This government balance-consistent growth rate effectively defines the lowest rate at which an economy can grow without experiencing budget deficits.[1] As Bajo-Rubio (2014) stated, if an economy grows at a rate greater than $\hat{y}_{gb}$ it will experience a budget surplus and if it grows at a rate lower than $\hat{y}_{gb}$ it will experience a budget deficit. In the latter case, the resulting budget deficits may affect the growth prospects of an economy in various ways, as discussed in the previous section. For example, a country may need to take corrective measures to tackle the persistent budget deficits as the resulting increases in government debt are a burden on future generations that cannot continue indefinitely without leading to a future fiscal crisis. These measures may come through a reduction in government expenditure or an increase in taxation, which may have a negative effect on future economic growth. Thus, the eventual tackling of persistent budget deficits and the resulting government debt may negatively affect future economic growth.

Using equation (1), this paper estimates the government budget balance-consistent growth rates for all nineteen euro area countries and then compares these estimates to the actual growth rates of these economies. This comparison enables conclusions to be drawn as to whether fiscal imbalances are likely to be a serious problem. This paper also investigates the predictions of the model and how they relate to the actual experience of these countries.[2] The next section presents and discusses the data, results and implications of the analysis.

4. Data, results and implications

4.1. Data

To apply the above framework, the analysis requires estimates of the growth rate of government expenditure ($\dot{g}$) and of the income elasticity of tax revenue (e_{ty}) for all 19 member states of the euro area. The analysis also requires estimates of the actual growth rate of real GDP ($\dot{y}$) for each country. As proxies for $\dot{g}$ and $\dot{y}$, the paper uses the estimated coefficient of the time trend in a regression of the natural logarithm of each variable in level form on a constant and a time trend. The data used in both cases is over the period 1995-2018 and were taken from the annual macroeconomic database of the European Commission's Directorate General for Economic and Financial Affairs (AMECO). The data for government expenditure refers to the real total expenditure of general government (code: OUTG), while data for the income variable refer to real

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[1] Bajo-Rubio (2014) refers to this as the *government balance-constrained growth rate*. This paper prefers the term *government balance-consistent growth rate* since an economy can grow at above this rate and experience a budget surplus, which is not necessarily a constraint.

[2] As mentioned in the previous section, there do not seem to be any other empirical studies that have employed the same approach as the present paper. There is, however, a huge literature investigating the sustainability of fiscal policy by focusing on the intertemporal budget constraint, see for example, the recent papers by Brady and Magazzino (2018a, 2018b) and the numerous studies cited therein.

Gross Domestic Product at 2010 reference levels (code OVGD). Data for the real total expenditure of general government were only available for all countries from 1995, and this dictated the sample size. Estimates for the income elasticity of tax revenue (e_{ty}) were taken from Koester and Priesmeier (2017), but the robustness of the results was checked by using other tax elasticity estimates as explained later in this paper.

4.2. Results

The results of the estimated government balance-consistent economic growth rates are summarised in Table 1.

The following points provide a discussion of the results presented in Table 1.

(a) The first observation that can be drawn from these results is that most euro area countries are growing at rates ($\dot{y}$) which are very similar to their government balance-consistent growth rates ($\hat{y}_{gb}$). This suggests that many of these countries should not be experiencing excessive imbalances in their government budget over the long-run. Thus, for many of these countries, the budget deficit may not pose a serious threat to future economic growth as corrective (contractionary) measures to tackle it would not be necessary. As can be seen in Table 1, six countries are growing at rates above their government balance-consistent growth rates and are, therefore, expected to experience budget surpluses. The remaining countries are growing at rates that are below their government balance-consistent growth rates and are, therefore, expected to experience budget deficits. However, for many of the latter countries, the actual growth rate is very close to the government balance-consistent growth rate and, as such, the resulting budget deficits may not be a serious problem. (Section 4.3 discusses further implications of the analysis, especially for those countries which are growing at rates that are below their government balance-consistent growth rate).

(b) The last two columns of Table 1 summarise the actual experience of these countries: they show, respectively, the average budget deficit and average budget surplus (as a percentage of GDP) over the period 1995-2018, i.e. the average deficit of those years where a country had a deficit and the average surplus of those years where a country had a surplus. This was calculated using data on Net lending/net borrowing of the general government as a percentage of GDP (variable code UBLG in the AMECO database). As can be seen, most of these countries had small budget imbalances over the period which tends to support the predictions of the model (as many of them were growing at rates which are very similar to their government balance-consistent growth rates).[3] It is important to mention here that this may be the result of the Stability and Growth Pact (SGP) which constrains, in general, euro area countries to budget deficits of no greater than 3% of their GDP. This SGP requirement imposes discipline on the growth of government expenditure in these countries which, via equation (1), lowers their government balance-consistent growth rate.

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[3] It goes without saying that if this paper had averaged deficits and surpluses together over the period, the resulting budget imbalances will be lower for most countries than those shown in Table 1.

Table 1. Estimates of the government balance-consistent economic growth rates.

	e_{ty}	$\dot{g}$	$\hat{y}_{gb}$	$\dot{y}$	Average budget deficit	Average budget surplus
Austria	0.99	1.42	1.43	1.70	-2.61	0.11
Belgium	1.06	2.00	1.89	1.67	-2.41	0.13
Cyprus	1.40	3.56	2.54	2.35	-3.95	1.54
Estonia	0.96	3.86	4.02	3.67	-1.00	1.30
Finland	1.07	2.01	1.88	1.81	-2.35	3.61
France	1.05	1.83	1.74	1.47	-3.60	*nap*
Germany	1.04	0.76	0.73	1.33	-2.88	0.87
Greece	1.21	1.15	0.95	0.41	-7.86	0.76
Ireland	0.88	4.14	4.70	4.52	-6.88	1.72
Italy	1.15	0.46	0.40	0.36	-3.37	*nap*
Latvia	0.98	4.17	4.26	3.77	-2.37	0.50
Lithuania	1.07	3.48	3.25	3.99	-3.32	0.46
Luxembourg	1.00	3.46	3.46	3.15	-0.87	2.28
Malta	1.17	2.90	2.48	3.25	-4.42	2.11
Netherlands	0.96	1.51	1.57	1.67	-2.78	0.63
Portugal	1.20	1.39	1.16	0.81	-4.84	*nap*
Slovakia	0.80	3.07	3.84	3.89	-4.57	*nap*
Slovenia	0.98	2.46	2.51	2.34	-3.75	0.37
Spain	1.06	2.26	2.13	1.88	-4.58	1.78

Notes and sources (Table 1): e_{ty} are the long-run income elasticities of tax revenue taken from Koester and Priesmeier (2017) except for Lithuania which was not part of their study. The estimate for Lithuania is taken from European Commission (2014, pg. 45); $\dot{g}$ is the (percentage) growth rate of real government expenditure; $\hat{y}_{gb}$ is the government balance-consistent economic growth rate calculated using equation 1; and $\dot{y}$ is the actual (percentage) growth rate of real GDP. The last two columns show the average budget deficit and average budget surplus (as a percentage of GDP) over the period 1995-2018 (i.e. the average deficit of those years where a country had a deficit and the average surplus of those years where a country had a surplus, respectively); nap stands for not applicable.

(c) The paper takes now a closer look at each country individually. As explained earlier in the paper, if an economy grows at a rate greater than $\hat{y}_{gb}$, the model predicts that it will have a budget surplus and if it grows at a rate lower than $\hat{y}_{gb}$ it will have a budget deficit. Therefore, as already mentioned, the model predicts a deficit for 13 euro area countries and a surplus for the remaining six. In several cases, these predictions seem to be consistent with the experience of these countries, but in some cases, they are not. Let's consider each country in turn by comparing the prediction of the model with the actual fiscal experience of each country over the 1995-2018 period:

- Austria: The model predicts a budget surplus. However, for most of the 1995-2018 period, the country has experienced a deficit, albeit a small one on average.
- Belgium: The model predicts a budget deficit. This is consistent with the experience of the country over most of the 1995-2018 period.
- Cyprus: The model predicts a budget deficit. This is consistent with the experience of the country over most of the 1995-2018 period.
- Estonia: The model predicts a budget deficit. However, for about half of the years over the 1995-2018 period, the country has experienced a small surplus and for the remaining years a small deficit (i.e. overall, the country had a fairly balanced budget).

- Finland: The model predicts a budget deficit. This is consistent with the post-2009 experience of the country but not with the pre-2009 experience.
- France: The model predicts a budget deficit. This is consistent with the experience of the country over the period as France has experienced deficits in all years of the 1995-2018 period.
- Germany: The model predicts a budget surplus. Even though Germany had a surplus in the post-2014 period, for almost all previous years it has experienced deficits.
- Greece: The model predicts a budget deficit. This is consistent with the experience of the country over most of the period.
- Ireland: The model predicts a budget deficit. However, for about half of the years over the 1995-2018 period, the country has experienced a surplus and for the remaining years a deficit.
- Italy: The model predicts a budget deficit. Italy has experienced deficits in all years of the 1995-2018 period.
- Latvia: The model predicts a budget deficit. This is consistent with the experience of the country over most of the period.
- Lithuania: The model predicts a budget surplus. This is not consistent with the experience of the country over most of the period.
- Luxembourg: The model predicts a budget deficit. This is not consistent with the experience of the country over most of the period.
- Malta: The model predicts a budget surplus. This is not consistent with the experience of the country over most of the period.
- Netherlands: The model predicts a budget surplus. The country had experienced surpluses in seven years over the period and deficits in the rest. These imbalances have been generally small.
- Portugal: The model predicts a budget deficit. Portugal has experienced deficits in all years of the 1995-2018 period.
- Slovakia: The model predicts a budget surplus. The model prediction is inconsistent with actual experience as Slovakia has experienced deficits in all years of the 1995-2018 period.
- Slovenia: The model predicts a budget deficit. This is consistent with the experience of the country over most of the period.
- Spain: The model predicts a budget deficit. This is consistent with the experience of the country over most of the period.

It is important to stress that the above (individual country) predictions should be interpreted with care as most of the euro area countries were growing at rates ($\ddot{y}$) which were very similar to their government balance-consistent growth rates ($\hat{y}_{gb}$). Thus, even though some of the individual predictions are not consistent with actual experience, the imbalances for most countries are predicted to be small (which was the case for many of these countries). This is also supported by the fact that most of these countries have experienced deficits in some years and surpluses in

others over the 1995-2018 period.

4.3. Implications

This section focuses on the implications of the analysis, especially for those countries whose actual growth rate is below their government balance-consistent growth rate and, as such, the resulting budget deficits may be a serious problem. Apart from the obvious implication that such countries should try to increase their actual rates of economic growth (in ways that do not increase their budget deficit), they may also try to take measures to reduce their government balance-consistent growth rate. It should be clear from equation (1) that this can be done in two ways: firstly, by reducing the growth rate of government expenditure ($\dot{g}$); and, secondly, by adopting measures that increase the income elasticity of tax revenue (e_{ty}).

If reducing the growth rate of government expenditure may have a negative impact on economic growth, what conclusion can be drawn about the appropriate rate of growth of government expenditure? To answer this question, we need to look at the evidence on tax revenue elasticities. The empirical literature seems to suggest that total tax revenue elasticities are not different from one for many countries.[4] For example, Deli *et al* (2018), using panel data of 25 OECD countries from 1965-2015, have shown that the long-run estimates of total revenue elasticities for the panel are not different from one. They have also shown that this result holds for most countries in their sample (for 16 out of 25 countries). Similar results have also been obtained by Dudine and Jalles (2018). Belinga *et al* (2014) have also found that, for about half of the countries in their sample, the long-run total tax buoyancies were not statistically different from one.[5] Using equation (1), these results from the literature suggest that, for many countries, a balanced government budget requires that the growth rate of government expenditure ($\dot{g}$) must be equal to the rate of economic growth ($\dot{y}$); or, to avoid deficits, the growth rate of government expenditure must not exceed the rate of economic growth. Put differently, any percentage change in government expenditure must lead to an at least equal percentage change in aggregate income.[6] A similar point has been made by Dudine and Jalles (2018). Another possible course of action is for countries to change the composition (but not the level) of their government expenditure in ways that enhance economic growth. For example, Bussière *et al* (2017) have shown that an increase in government investment of 1% of GDP that is compensated by a similar fall in government consumption will stimulate economic growth.

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[4] Even though Koester and Priesmeier (2017) have found that, for most of the countries in their sample, the long-run tax revenue elasticities are statistically different from one, the estimated value for many of them is close to one. This is also supported by the data given in Table C1 of their paper that summarises tax revenue elasticities estimated in other studies. As Koester and Priesmeier (2017) note, the difference in these elasticity estimates is small despite the fact that some of the estimates are based on GDP growth and others on the output gap.

[5] See Deli *et al* (2018), Dudine and Jalles (2018) and Koester and Priesmeier (2017) for a discussion of the differences between tax buoyancies and tax elasticities.

[6] This does not mean that the fiscal multiplier effect is not present. This is because, in absolute monetary (euro) terms, a given percentage change in GDP is a bigger value than the same percentage change in government spending. For example, a 1% increase in government spending may lead to a 1% increase in GDP but the latter change is bigger in absolute monetary terms (due to the multiplier effect). However, as Ramey (2019) shows, recent evidence suggests that government expenditure multipliers range from 0.6-1, i.e. they may be less than 1.

The second course of action for a country is to adopt measures that increase the income elasticity of tax revenue. There are many factors that could influence this. As Koester and Priesmeier (2017) argue, the composition of tax revenue (as between various direct and indirect taxes) is relevant here. For example, empirical evidence tends to suggest that corporate taxes are more responsive to GDP growth and have a long-run tax buoyancy greater than one in advanced economies, see for example the evidence presented by Belinga *et al* (2014), Dudine and Jalles (2018) and Deli *et al* (2018).[7] Thus, if total tax revenue relies more heavily on more buoyant taxes, then the income elasticity of total tax revenue will be higher (Dudine and Jalles, 2018). Furthermore, as Dudine and Jalles (2018) and Koester and Priesmeier (2017) argue, taking measures to improve tax collection in ways that enhance tax compliance would also increase the income elasticity of total tax revenue. In addition, Dudine and Jalles (2018) have shown that more openness to trade, higher human capital, and lower volatility in output and inflation would also increase tax buoyancies. Koester and Priesmeier (2017) have also argued that a more progressive tax structure could increase tax revenue elasticities. The above factors, therefore, could be considered by a country trying to increase its income elasticity of total tax revenue. For a more detailed discussion of these factors see Dudine and Jalles (2018), Koester and Priesmeier (2017) and Belinga *et al* (2014).

5. Checking the robustness of the results

To check the robustness of the conclusions, this paper has also calculated government balance-consistent growth rates using elasticity estimates from two other sources: (a) the long-run total tax buoyancies estimated by Dudine and Jalles (2018) (for those countries whose estimates were statistically significant); and, (b) the long-run total tax buoyancies estimated by Belinga *et al* (2014). The results of these robustness checks are presented in Table 2. (Please note that not all euro area countries were covered by the above two studies).

Comparing the actual growth rates of these countries with the government balance-consistent growth rates calculated using the new elasticity estimates (given in Table 2) reveals that the conclusions remain the same for most countries. Thus, the results and conclusions based on Table 1 are robust with the following four exceptions:

- Ireland: The conclusions for Ireland remain the same when using the Dudine and Jalles (2018) elasticity estimate but not when using the Belinga et al. (2014) estimate. In the latter case, the model predicts a budget surplus. As has been noted earlier, for about half of the years over the 1995-2018 period, the country had experienced a surplus and for the remaining years a deficit.

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[7] The latter two studies have also shown that corporate income tax buoyancies are greater during downturns than during expansions of economic activity. For another analysis of the effects of the business cycle on tax elasticities, see Boschi and d'Addona (2017).

Table 2. Robustness checks.

	e_{ty} (B)	e_{ty} (DJ)	$\hat{y}_{gb}$ (B)	$\hat{y}_{gb}$ (DJ)	$\dot{y}$
Austria	1.07	1.0	1.33	1.42	1.70
Belgium	1.03	1.013	1.94	1.97	1.67
Cyprus	*na*	1.446	*na*	2.46	2.35
Estonia	0.98	1.019	3.94	3.79	3.67
Finland	1.08	1.007	1.86	2.00	1.81
France	1.12	1.054	1.63	1.74	1.47
Germany	1.05	1.422	0.72	0.53	1.33
Greece	1.09	1.953	1.06	0.59	0.41
Ireland	0.98	0.911	4.22	4.54	4.52
Italy	1.13	0.807	0.41	0.57	0.36
Latvia	*na*	*na*	*na*	*na*	3.77
Lithuania	*na*	*na*	*na*	*na*	3.99
Luxembourg	1.05	ns	3.30	*na*	3.15
Malta	*na*	*na*	*na*	*na*	3.25
Netherlands	0.86	*ns*	1.76	*na*	1.67
Portugal	1.12	1.295	1.24	1.07	0.81
Slovakia	0.75	0.798	4.09	3.85	3.89
Slovenia	1.01	1.017	2.44	2.42	2.34
Spain	1.21	*ns*	1.87	*na*	1.88

Notes and sources (Table 2): e_{ty} (B) are the long-run total tax buoyancies taken from Table 1 of Belinga et al (2014); e_{ty} (DJ) are the long-run total tax buoyancies taken from Table A1a of Dudine and Jalles (2018); $\hat{y}_{gb}$ (B) and $\hat{y}_{gb}$ (DJ) are the respective government balance-consistent growth rates calculated using equation (1); $\dot{y}$ is the actual (percentage) growth rate of real GDP; na implies that data were not available and ns implies that the estimates were not statistically significant and, therefore, not utilised.

- Netherlands: Using the Belinga et al. (2014) elasticity estimate, the model now predicts a budget deficit. As has been noted earlier, the country had experienced surpluses in seven years over the period and deficits in the rest (but these imbalances have generally been small).

- Slovakia: The conclusions for Slovakia remain the same when using the Dudine and Jalles (2018) elasticity estimate but not when using the Belinga et al. (2014) estimate. In the latter case, the model now predicts a budget deficit which is consistent with actual experience, as Slovakia had experienced deficits in all the years of the 1995-2018 period.

- Spain: Using the Belinga et al. (2014) elasticity estimate, the model now predicts a balanced budget as the actual growth rate is almost the same as the government balance-consistent growth rate. As has been noted earlier, though, Spain has experienced budget deficits over most of the 1995-2018 period.

6. Conclusions

An important issue in macroeconomics is the link between economic growth and the government fiscal balance. Using the model derived by Bajo-Rubio (2014), this paper has estimated government budget balance-consistent growth rates for the euro area countries and compared these estimates to the actual growth rates of these economies. This comparison enabled an

assessment as to whether any fiscal imbalances may pose a threat to future economic growth. This threat could arise, for example, from the fact that a country may need to take corrective measures to tackle any persistent budget deficits, as the resulting increases in government debt cannot continue indefinitely without leading to a future financial crisis. These corrective (contractionary) fiscal measures may, therefore, have a negative impact on future economic growth. Such corrective measures may also be necessary if budget deficits lead to higher inflation and higher current account deficits. Furthermore, budget deficits may lower economic growth if they lead to higher interest rates that may crowd-out private investment.

The analysis has revealed that most euro area countries are growing at rates that are very similar to their government balance-consistent growth rates. This finding suggests that many of these countries would not be experiencing excessive fiscal imbalances. Therefore, there would be no need for major contractionary measures that could harm future economic growth. This finding may be the result of the fiscal discipline imposed on these countries by the Stability and Growth Pact. The analysis has also shown that, for many countries in the sample, the predictions of the model seem to be broadly consistent with their actual fiscal experience. In terms of policy implications, this paper has summarised ways to reduce the government balance-consistent growth rate by increasing the income elasticity of tax revenue and/or by reducing the growth rate of government expenditure.

Acknowledgements

References

Adam, C.S. and Bevan, D.L. (2005). Fiscal deficits and growth in developing countries. *Journal of Public Economics*, 89, 571-597. https://doi.org/10.1016/j.jpubeco.2004.02.006

Ahmad, A.H. and Aworinde, O.B. (2019). Are fiscal deficits inflationary in African countries? A new evidence from an asymmetric cointegration analysis. *North American Journal of Economics and Finance*, 50. https://doi.org/10.1016/j.najef.2019.100999

Bajo-Rubio, O. (2014). Balance-constrained growth rates: generalizing Thirlwall's law. *Applied Economics Letters*, 21(9), 593–596. https://doi.org/10.1080/13504851.2013.877563

Belinga, V., Benedek, D., de Mooij, R. and Norregaard, J. (2014). Tax Buoyancy in OECD Countries. International Monetary Fund, *IMF Working Paper* WP/14/110. https://doi.org/10.5089/9781498305075.001

Boschi, M. and d'Addona, S. (2017). The stability of tax elasticities over the business cycle in European countries. Australian National University, *CAMA Working Paper* 44/2017. https://doi.org/10.2139/ssrn.2967524

Brady, G. L. and Magazzino, C. (2018a). Fiscal sustainability in the EU, *Atlantic Economic Journal*, 46(3), 297-311, doi:10.1007/s11293-018-9588-4. https://doi.org/10.1007/s11293-018-9588-4

Brady, G. L. and Magazzino, C. (2018b). Government debt in EMU countries, *The Journal of Economic Asymmetries*, 18. https://doi.org/10.1016/j.jeca.2018.e00096

Bussière, M., Ferrara, L., Juillard, M. and Siena, D. (2017). Can fiscal budget-neutral reforms stimulate growth? Model-based results. Banque de France *Working Paper* No. 625. https://doi.org/10.2139/ssrn.2955120

Castro, V. (2011). The impact of the European Union fiscal rules on economic growth. *Journal of Macroeconomics*, 33(2), 313-326. https://doi.org/10.1016/j.jmacro.2010.09.003

Catão, L.A.V. and Terrones, M.E. (2005). Fiscal deficits and inflation. *Journal of Monetary Economics*, 52(3), 529-554. https://doi.org/10.1016/j.jmoneco.2004.06.003

Cebula, R.J. (1995). The impact of federal budget deficits on economic growth in the United States: An empirical investigation, 1955-1992. *International Review of Economics and Finance*, 4(3), 245-252. https://doi.org/10.1016/1059-0560(95)90042-X

Cebula, R.J. (2018). Impact of US federal government budget deficits on the *ex ante* real interest rate yield on 10-year treasury notes during the post-Bretton Woods (1972-2016) era. *Journal of Economics and Finance*, 42, 828-835. https://doi.org/10.1007/s12197-017-9424-8

Deli, Y., Rodriguez, A. G., Kostarakos, I. and Varthalitis, P. (2018). Dynamic tax revenue buoyancy estimates for a panel of OECD countries. The Economic and Social Research Institute (ESRI) Dublin, *ESRI Working Paper* No. 592.

Dudine, P. and Jalles, J. T. (2018). How buoyant is the tax system? New evidence from a large heterogeneous panel. *Journal of International Development*, 30(6), 961-991. https://doi.org/10.1002/jid.3332

European Commission (2014). Report on Public Finances in EMU 2014. *European Economy* 9-2014. https://doi.org/10.2765/7626

Forte, F. and Magazzino, C. (2013). Twin deficits in European countries. *International Advances in Economics Research*, 19(3), 289-310, https://doi.org/10.1007/s11294-013-9406-3

Jalil, A., Tariq, R. and Bibi, N. (2014). Fiscal deficit and inflation: New evidences from Pakistan using a bounds testing approach. *Economic Modelling*, 37, 120-126. https://doi.org/10.1016/j.econmod.2013.10.029

Kameda, K. (2014). Budget deficits, government debt, and long-term interest rates in Japan. *Journal of Japanese and International Economies*, 32, 105-124. https://doi.org/10.1016/j.jjie.2014.02.001

Koester, G. and Priesmeier, C. (2017). Revenue elasticities in euro area countries. European Central Bank*, ECB Working Paper* 1989.

Lau, W-Y. and Yip, T-M. (2019). The nexus between fiscal deficits and economic growth in ASEAN. *Journal of Southeast Asian Economies*, 36(1), 25-36. https://doi.org/10.1355/ae36-1d

Laubach, T. (2009). New evidence on the interest rate effects of budget deficits and debt. *Journal of the European Economic Association*, 7(4), 858-885. https://doi.org/10.1162/JEEA.2009.7.4.858

Lin, H-Y. and Chu, H-P. (2013). Are fiscal deficits inflationary? *Journal of International Money and Finance*, 32, 214-233. https://doi.org/10.1016/j.jimonfin.2012.04.006

Ramey, V.A. (2019). Ten years after the financial crisis: What have we learned from the renaissance in fiscal research? *Journal of Economic Perspectives*, 33(2), 89-114. https://doi.org/10.1257/jep.33.2.89

Taylor, L., Proaño, C.R., de Carvalho, L. and Barbosa, N. (2012). Fiscal deficits, economic growth and government debt in the USA. *Cambridge Journal of Economics*, 36 (1), 189–204. https://doi.org/10.1093/cje/ber041

Thirlwall, A. P. (1979). The balance of payments constraint as an explanation of international growth rate differences. *Banca Nazionale del Lavoro Quarterly Review*, 32(128), 45–53, (republished in 2011 in *PSL Quarterly Review*, 64(259).

Thirlwall, A. P. (2011). Balance of payments constrained growth models: history and overview. *PSL Quarterly Review*, 64(259), 307–351.

Trachanas, E. and Katrakilidis, C. (2013). The dynamic linkages of fiscal and current account deficits: New evidence from five highly indebted European countries accounting for regime shifts and asymmetries. *Economic Modelling*, 31, 502-510. https://doi.org/10.1016/j.econmod.2012.12.026