Twin deficits revisited: A role for fiscal institutions?

António Afonso [a,*], Florence Huart [b], João Tovar Jalles [c,d,e,f], Piotr Stanek [g]

[a] ISEG – Lisbon School of Economics and Management, Universidade de Lisboa, REM – Research in Economics and Mathematics, UECE, UECE – Research Unit on Complexity and Economics is supported by Fundação para a Ciência e a Tecnologia, Portugal
[b] Univ. Lille, CNRS, UMR 9221 – LEM, F-59000 Lille, France
[c] Instituto Superior de Economia e Gestão (ISEG), Universidade de Lisboa, Rua do Quelhas 6, 1200-781 Lisboa, Portugal
[d] Research in Economics and Mathematics (REM) and Research Unit on Complexity and Economics (UECE), ISEG, Universidade de Lisboa, Rua Miguel Lupi 20, 1249-078 Lisbon, Portugal
[e] Economics for Policy, Nova School of Business and Economics, Universidade Nova de Lisboa, Rua da Holanda 1, 2775-405 Carcavelos, Portugal
[f] IPAG Business School, 184 Boulevard Saint-Germain, 75006 Paris, France
[g] Cracow University of Economics, Poland

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ABSTRACT

We revisit the twin-deficits relationship for a sample of 65 countries with fiscal rules over the period 1985–2015, using a panel data estimation methods. Our analysis accounts for the role of various types of fiscal rules and institutions: expenditure rules, revenue rules, budget balance rules, debt rules, fiscal councils, and supporting procedures. We find that the twin-deficits hypothesis is confirmed. The impact of the budget balance on the current account balance is increased when fiscal rules are considered, except with revenue rules and debt rules. Well-designed fiscal rules, fiscal councils and features that reinforce compliance with rules improve the current account balance. Our findings highlight the role of fiscal factors in explaining sustained global current account imbalances. They also contribute to the ongoing discussion about the improvement of macroeconomic and budgetary surveillance in the European context.

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1. Introduction

Global imbalances along with fiscal consolidation in the aftermath of the Global Financial Crisis (GFC) and the Great Recession have rekindled the literature about the twin-deficits hypothesis: do fiscal deficits cause external deficits? This has been a paramount issue, especially in the case of some Euro Area (EA) member countries, where both fiscal and current account imbalances were quite acute during the GFC. Results from recent empirical studies are not conclusive though. The effect of budget balance changes on external balances varies substantially across studies. The introduction of some other relevant factors among the determinants of external balances may reduce much or even counteract the impact of budget deficits on external deficits.

Determining whether the twin-deficits hypothesis holds or not is an important issue, because fiscal consolidation may help bring about a reduction in current account deficits if the hypothesis holds for some countries (Bluedorn and Leigh,

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* Corresponding author.
  E-mail addresses: aafonso@iseg.ulisboa.pt (A. Afonso), florence.huart@univ-lille.fr (F. Huart), joaojalles@gmail.com (J. Tovar Jalles), piotr.stanek@uek.krakow.pl (P. Stanek).

2011; Litsios and Pilbeam, 2017; Trachanas and Katrakilidis, 2013) but it is not a panacea if the hypothesis is not confirmed for all countries (Afonso et al., 2013; Algieri, 2013). In the latter case, fiscal consolidation could be unnecessarily painful for the economies considered (if it was implemented solely for addressing a problem of external imbalance). Some authors even have expressed doubts about the effectiveness of fiscal policy in the correction of external imbalances (Abbas et al., 2011; Corsetti and Muller, 2006; Nickel and Tudyka, 2014). Naturally, even if fiscal consolidations do not bring down current account deficits, there might still be a need for fiscal consolidation *per se*. In addition, the latter may be called for because of the existence of fiscal rules.

In this paper, we want to investigate the role of fiscal rules in the relationship between fiscal and external balances, notably covering several country groups (advanced economies, emerging market economies, low-income countries, and resource-rich countries). Indeed, the use of fiscal rules has become widespread, but their features and strict enforcement have been diverse across countries (Schaechter et al., 2012). In line with the literature, we define a fiscal rule as "a long-lasting constraint on fiscal policy through numerical limits on budgetary aggregates" (Lledó et al., 2017, p. 8; see also Kopits and Symansky, 1998, p. 2). Thus, the fiscal rules considered here are target rules as opposed to instrument rules. The existence of fiscal rules is usually denoted by dummies (Guerguil et al., 2017), but also by discrete or continuous variables (Heinemann et al., 2018). In our case, we construct indices of various fiscal rules by taking into account their features. We also build a Global Fiscal Rules Index (GFRI) that measures how well-designed fiscal rules are to reach fiscal objectives.

Therefore, our contribution to the literature considers notably several types of fiscal rules and institutions: expenditure rules, revenue rules, budget balance rules, debt rules, fiscal councils and various supporting procedures (monitoring, enforcement, legal basis, transparency and accountability among others). We explain the effects of each kind of rule on the current account balance (direct effects) and on the twin-deficits hypothesis (indirect effects via the influence of fiscal rules on the impact of the budget balance on the current account balance). A major result and implication from the analysis is that well-designed fiscal rules, fiscal councils and features that reinforce compliance with rules improve the current account balance, which is a relevant policy link between fiscal policies and current account imbalances. This is true remarkably for advanced countries, among which Euro area member countries.

The remainder of the paper is organized as follows. Section 2 outlines the theoretical framework. Section 3 reviews the relevant related empirical literature. Section 4 details the econometric methodology and presents the data together with some stylized facts. Section 5 discusses our empirical results. Section 6 concludes.

2. Theoretical framework

2.1. The Macro identity

The relationship between the current account balance and the government budget balance can easily be understood by drawing from a few open-economy identities. First, we can recall the standard macro identity:

$$Y \equiv C + I + G + X - M \tag{1}$$

where Y is domestic output, C is private consumption expenditure, I is private investment, G is government expenditure, X are exports of goods and services, and M are imports of goods and services. Second, we can use the definition of national income (R) which adds net factor income (NFI) from the rest of the world to GDP (Y):

$$R \equiv Y + NFI \tag{2}$$

Third, disposable income ($R - T$) can be either consumed or saved:

$$R \equiv C + S + T \tag{3}$$

where S denotes private saving and T taxes. Fourth, the definition of the current account (CA) is the sum of the trade balance ($X - M$) and net factor income:

$$CA \equiv (X - M) + NFI \tag{4}$$

Using (1) and (3) in (2), knowing (4), we obtain an identity where the current account balance (CA) is defined as the sum of net private saving (the net lending position of the private sector) and net public saving (the net lending position of the public sector or government budget balance $BB = T - G$):

$$CA \equiv (S - I) + (T - G) \tag{5}$$

The main point of the twin-deficits argument is that fiscal shocks drive the current account in the same direction.[1] In particular, a government budget deficit ($T - G < 0$) would be associated with a current account deficit ($CA < 0$). Of course, this holds when the government budget is not fully financed by domestic private saving and needs to be financed by foreign capital inflows. However, a budget deficit may lead to an increase in the net lending position of the private sector to such an extent

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[1] For a review of the literature, see Abbas et al. (2011).

that there is no effect on the current account balance or the latter may even move towards an opposite direction and turn positive ("twin divergence"). This is so when private saving increases or private investment decreases following the shock of fiscal deficit.

2.2. Channels for the twin-deficits hypothesis

It is then relevant to assess to which conditions the twin-deficits hypothesis holds or does not hold. One needs to think about the effects of government budget deficits on private saving, private investment, net exports, and net factor income. They depend on the exchange rate regime, the macroeconomic context, the level of government debt, and presumably – this is the matter at hand – fiscal institutions, and in particular fiscal rules.[2]

The relationship between the budget deficit and the current account deficit can first be analysed with the Mundell-Fleming model (Abbas et al., 2011; Salvatore, 2006). A fiscal expansion causes a current account deficit because the increase in domestic aggregate demand boosts imports of foreign goods and services. The increase in the demand for loanable funds to finance the fiscal deficit causes higher domestic interest rates. With international capital movements and a flexible exchange rate, there are capital inflows and a subsequent appreciation of the domestic currency, which can reduce net exports and cause a current account deficit. In the short term, the twin deficits may not materialize though because the appreciation of the domestic currency lowers import prices and improves the terms of trade.[3]

The exchange rate channel is less potent in countries with a fixed exchange rate, which implies a higher fiscal multiplier (Born et al., 2013), and a higher probability of twin deficits. An implication is that a fiscal consolidation, which brings about a currency depreciation, can be more contractionary in fixed exchange rate regimes, because the real depreciation and the increase in net exports are smaller than in floating exchange rate regimes (Guajardo et al., 2011). In this respect, Bluedorn and Leigh (2011) find that fiscal consolidation can improve the current account in the countries that adopted the euro, and this through "internal devaluation", with a sharp contraction in domestic demand (investment) and a strong reduction in domestic costs and prices. Gaysset et al. (2019) even show that fiscal consolidation in the core EMU (European Monetary Union) countries during the crisis had spillover effects on the peripheral EMU countries, accentuating their twin deficits.

The effect of budget deficits on the current account is reduced if public spending crowds out private spending due to higher interest rates. However, Corsetti and Müller (2006) show, using a New Open Economy Macroeconomics (NOEM) model, that the twin-deficits hypothesis is likely to hold for economies that are more open and with more persistent fiscal shocks. Indeed, they stress the importance of the terms of trade channel that can counterbalance the interest rate channel.[4]

Ricardian equivalence makes twin deficits less likely because of an increase in private saving (Obstfeld and Rogoff, 1995b). A decrease in taxes leaves the current account balance unaffected if households save more in order to offset future tax increases which are necessary to satisfy the government intertemporal budget constraint. At high levels of government debt, budget deficits are even contractionary because current generations of households know that they will be more likely still alive when the debt stabilisation programme will be implemented (Sutherland, 1997).[5] Still, an increase in government spending has a positive effect on consumption of liquidity-constrained households, especially during bad times (Perotti, 1999).[6] A high share of non-Ricardian households thus reinforces the effect of the government budget balance on the current account balance (Bussière et al., 2010).

Hürtgen and Rühmkorf (2014) present a model in which Keynesian twin deficits and Ricardian equivalence can be reconciled in a state-dependent setup. When government debt is high, sovereign risk premia rise, and uncertainty about future taxes increases.[7] As a result, precautionary saving builds up, which lowers the impact of the budget balance on the current account balance. In contrast, in this paper, we consider an opposite effect: an increase in government indebtedness may lead to an increase in external debt, an increase in interest payments paid to non-residents, which may induce a deficit in net factor income of the current account balance, and hence twin deficits. In the empirical part of the paper, we test this "NFI effect".

There are other channels in overlapping-generations models that generate twin deficits. Boileau and Normandin (2012) explain that a tax cut can raise the external deficit via two channels. In the standard demographic channel, consumers can shift a part of the additional future tax burden onto next generations, which raises their wealth and makes them consume

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[2] The relevance of twin deficits is also influenced by whether the fiscal deficit relies on expenditures or taxes (Corsetti and Muller, 2006), the composition of government expenditure (Cavallo, 2005), the stance of monetary policy (Chen, 2007), and fiscal policy differentials among countries (Ferrero, 2010).

[3] Müller (2008) stresses the importance of such valuation effects caused by changes in relative prices in a dynamic stochastic general equilibrium (DSGE) model. Note that in New Open Economy Macroeconomics (NOEM) models, a positive shock on government spending crowds out private spending. This causes a decrease in domestic spending relative to foreign spending, which requires a nominal *depreciation* of the domestic currency to restore money market equilibrium (see Obstfeld and Rogoff, 1995a; Betts and Devereux, 2000).

[4] The increase in prices of domestic goods relative to prices of imported goods raises the rate of return to capital (much in an economy where the import content of investment is high), and as a consequence, private investment increases (more so if the shock is more persistent and the improvement in the terms of trade lasts longer).

[5] Such a contractionary effect is confirmed in the empirical analysis of Ilzetzki et al. (2013). The fiscal multiplier is near zero in Huidrom et al. (2019), and one can recall the discussion about the so-called expansionary fiscal consolidations (see, for instance, Afonso and Martins, 2016).

[6] Bachmann and Sims (2012) show that the fiscal multiplier is higher during recessions because confidence rises.

[7] Since the necessity of raising taxes is reduced in case of default, the dispersion of expected future tax rates is higher, which is a source of greater uncertainty.

more and save less in the current period. In the forecasting channel, if today's higher budget deficit signals a future increase in output, the increase in consumers' wealth raises current consumption.

2.3. The relevance of fiscal institutions

Finally, the existence of fiscal rules may affect the relationship between the budget balance and the current account balance. Badinger et al. (2017) identify three effects, the first two are direct effects, and the last one indirect:

- Stringent fiscal rules reduce uncertainty about future developments of fiscal policy, which reduces precautionary savings and has a negative impact on the current account balance.
- Stringent fiscal rules lower interest rates, which boosts private spending but also net exports (with a currency depreciation). The impact on the current account balance is ambiguous.
- Stringent fiscal rules induce stronger Ricardian equivalence, because private agents expect the government to reduce the budget deficit in the future. This reduces the impact of the budget balance on the current account balance.

Here, we analyse further the implications of fiscal rules by drawing on insights from the literature on fiscal rules and considering various kinds of fiscal rules and institutions (see Eyraud et al., 2018). We also look at different groups of countries, when possible: advanced economies (AEs), emerging market economies (EMEs), low-income countries (LICs), and resource-rich countries. Table A1 in Appendix A summarizes all expected effects.

Direct effects of fiscal rules (FR). Fiscal rules promote fiscal discipline during good times (Tóth, 2019), and more stringent FRs improve fiscal outcomes (Badinger and Reuter, 2017; 2015; Beetsma et al., 2019; Caselli and Reynaud, 2019; Debrun and Kinda, 2017; Lagona and Padovano, 2007). This is so even after taking into account voter preferences (Krogstrup and Wälti, 2008). Accordingly, we expect that they have a positive effect on the current account. However, they may also have a negative impact because they are found to reduce sovereign risk premia (Hallerberg and Wolff, 2008), interest rates and output volatility (Badinger and Reuter, 2017). The negative effect of lower interest rates on the current account (via an increase in domestic spending) is expected to be stronger in countries with a fixed exchange rate (since a nominal depreciation does not occur, which does not boost net exports).

Indirect effects. Fiscal rules are associated with a reduction in the use of discretionary, cyclically adjusted, fiscal policy (Badinger, 2009). This raises the role of automatic stabilizers and the counter-cyclicality of fiscal policy, and hence reduces the likelihood of twin deficits. The indirect effect is therefore negative. This is also true if stronger FRs reinforce Ricardian equivalence. In contrast, the indirect effect can be positive in EMEs and LICs where FRs are found to be weak (Badinger and Reuter, 2015).

Alternatively, FRs may not have any effect because they may lead to creative accounting (Milesi-Ferretti, 2004), they are associated with biased fiscal or growth forecasts (Gilbert and de Jong, 2017; von Hagen, 2010), and they have become more complex (Debrun and Jonung, 2019), which does not help the credibility of the commitment to follow the rules, nor improve the predictability of fiscal policy nor reduce uncertainty after all.

Expenditure rules (ER). The findings by Cordes et al. (2015) proved a mixed picture about the direct effects: on the one hand, ERs improve fiscal outcomes and reduce public investment, which should exert a positive impact on the current account; on the other hand, they make fiscal policy more predictable, which may exert a negative impact. Moreover, the effect on private investment is ambiguous, because it depends on whether public investment is a complement or a substitute to private investment, and on the composition of government spending (for instance, a decrease in subsidies to the private sector may have an adverse effect on private spending). Also, ERs improve fiscal outcomes in LICs (Tapsoba, 2012). As for indirect effects, the sign is uncertain as well: the compliance with ERs is the highest among various kinds of fiscal rules (Cordes et al., 2015; Reuter, 2015), especially in AEs (Debrun and Jonung, 2019), which should reduce the impact of the budget balance on the current account, but ERs are also the least strong fiscal rules (Beetsma et al., 2019), which should increase the likelihood of twin deficits. Furthermore, strong ERs reduce the procyclical bias in government expenditure (Holm-Hadulla et al., 2012), but not in resource-rich countries (Bova et al., 2018). Therefore, twin deficits are less likely in the former case, and more likely in the latter case.

Revenue rules (RR). We expect little effect of revenue rules on the twin-deficits relationship because they are the least widespread FRs (Badinger and Reuter, 2015) and hardly used in LICs (Tapsoba, 2012). They are likely to produce negative direct effects on the current account and mitigate the twin-deficits relationship, because not only they are the least effective fiscal rules (the government having little control over revenue which are more sensitive to the business cycle than expenditure), but also not widespread (Beetsma et al., 2019; Bergman et al., 2016).

Budget balance rules (BBR). The direct effects of BBRs are expected to be positive. Indeed, they are associated with a reduction in public expenditure and government debt (Asatryan et al., 2018; Azzimonti et al., 2016), and reduce the political business cycle in fiscal balances by restraining the politicians' ability to manipulate the budget before elections (Rose, 2006). Additionally, they are the most effective rules in improving fiscal outcomes (Beetsma et al., 2019), although there are endogeneity issues because governments with a preference for fiscal discipline are more likely to implement more stringent BBRs (Bergman et al., 2016; Heinemann et al., 2018). The improvement of the budget balance is also found in LICs (Tapsoba, 2012). In other respects, BBRs reduce the twin-deficits relationship because they are the most stringent FRs in AEs (Badinger and Reuter, 2015) but they could potentially reinforce this relationship as well because compliance is the lowest with such rules

(Reuter, 2015), especially in EMEs (Debrun and Jonung, 2019) or compliance is difficult to monitor when rules are too complex (Schaechter et al., 2012).

Debt rules (DR). We expect DRs to have a negative effect on the current account, especially in LICs, because they do not improve the budget balance in these countries (Tapsoba, 2012). This is probably related to the fact that DRs are less well calibrated in LICs (Eyraud et al., 2018). They presumably reduce the twin-deficits relationship as long as empirical evidence points to the highest degree of compliance with such rules (Reuter, 2019; 2015), in particular in EMEs (Debrun and Jonung, 2019).

Fiscal council (FC). An independent fiscal body, such as a fiscal council, reinforces transparency in fiscal governance and makes future developments in fiscal policy more predictable. This reduces uncertainty and the need for precautionary saving, while a business-friendly environment favours investment spending. In such a case, we would expect a negative effect of FCs on the current account. However, the direct effect could be positive all the same, because FCs are complements to FRs and improve fiscal outcomes (Debrun and Kinda, 2017). More generally, strong fiscal institutions foster fiscal discipline. They reduce the deficit bias when political fragmentation is strong (de Haan et al., 2013). As for the impact on the twin-deficits relationship, it is most likely negative since FCs foster compliance with rules (Beetsma et al., 2019; Eyraud et al., 2018).

3. Related empirical studies

In this section, we briefly review recent related empirical studies on the twin-deficits hypothesis.[8] Another related literature deals with the fundamental determinants of the current account. As long as the budget balance belongs to these factors, the results of empirical studies are useful to check the twin-deficits hypothesis: a positive statistically significant estimated coefficient on the budget balance variable in an equation where the current account balance is the dependent variable can be interpreted as evidence supporting the hypothesis.[9]

In studies where there is evidence of twin deficits, the estimated coefficient is in the range between 0.10 and 0.70, with the lowest values found in Lee et al. (2008), Bussière et al. (2010), Abbas et al. (2011), and the highest values in Barnes et al. (2010), Bluedorn and Leigh (2011), Afonso et al. (2013) among others.

The twin-deficits hypothesis is most often rejected in studies that are based on a Vector Autoregression (VAR) analysis of the U.S. times series (Corsetti and Muller, 2006; Grier and Ye, 2009; Kim and Roubini, 2008; Müller, 2008).[10] Twin divergence is explained by low degrees of trade openness and fiscal shock persistence (Corsetti and Muller, 2006), and the combination of a Ricardian effect and a crowding-out effect (Kim and Roubini, 2008). There are some exceptions though: evidence of twin deficits is found when the U.S. budget deficits are lagged one period (Salvatore, 2006) or large (Holmes, 2011).

In panel regressions, mixed results emerge too: the hypothesis is confirmed with tax shocks (Boileau and Normandin, 2012); there is no relationship (Cerrato et al., 2015); the relationship holds only in the long term (Gossé and Serranito, 2014); the relationship is stronger in EMEs and LICs than in AEs and weaker when the external debt-to-GDP ratio in developing economies is above 45%, which is the median sample (Abbas et al., 2011); it vanishes in a sub-sample of 23 European Union (EU) countries (Abiad et al., 2009); there is reverse causality for some countries (Xie and Chen, 2014).[11]

For EA countries with large internal and external imbalances (among which Greece, Ireland, Italy, Portugal, and Spain), evidence of twin deficits is mixed too: the hypothesis is rejected (Algieri, 2013), confirmed (Gaysset et al., 2019), or confirmed only for Greece, Portugal and Spain (Litsios and Pilbeam, 2017; Trachanas and Katrakilidis, 2013).

The level of government debt matters. In Nickel and Vansteenkiste (2008), the estimated coefficient of the budget balance is 0.45 when the government debt-to-GDP ratio is below 35% in a panel of 22 industrialised countries, but it is negative and not statistically significant when the ratio is above 90%, supporting the hypothesis of twin divergence when Ricardian equivalence is likely to prevail. This is confirmed by Nickel and Tudyka (2014), and Hürtgen and Rühmkorf (2014).

The presence of fiscal rules seems to matter as well. Badinger et al. (2017) tested the influence of the strength of two sorts of rules – BBRs and DRs – for a panel of 73 countries over the period 1985–2012. Their baseline results (without any rules) confirm the twin-deficits hypothesis: the estimated coefficient is 0.19. Once fiscal rules are introduced in the regressions, they have no direct effects on the current account, but they have a negative indirect effect (via the interaction term with the budget balance): the impact of the budget balance on the current account balance is reduced to 0.16 with more stringent rules.

Therefore, and to summarise, the relevance of current account imbalances and their links with fiscal imbalances, in the context of the GFC, when external and fiscal rebalancing were afterwards needed, seems paramount both from an analytical approach and from a policy perspective, either in Euro area or in non-euro area economies.

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[8] Table B1 in Online Appendix B provides a summary of the methods and results.

[9] For a review of earlier empirical studies on twin deficits, see Abbas et al. (2011), Algieri (2013), and Afonso et al. (2013). For the determinants of the current account, see Barnes et al. (2010).

[10] Ferrero (2010) also finds no evidence of twin deficits in the United States (U.S.) using a different methodology, namely: simulations of a life-cycle model. By comparison, a similar VAR methodology used by Beetsma et al. (2008) confirms the twin-deficits hypothesis for a panel of 14 European Union countries.

[11] The latter result illustrates the "current account targeting hypothesis" for Ireland, Spain and Sweden. It was also found for Greece by Kalou and Paleologou (2012). The intuition is that economic policies of a country aim at, *inter alia*, maintaining external equilibrium (Summers, 1988, p. 351).

4. Econometric methodology and data

4.1. Panel analysis

We estimate a reduced-form empirical model on the determinants of the current account:

$$CA_{it} = \delta_t + \gamma_i + \alpha_1 BB_{it} + \alpha_2 FI_{it} + \mathbf{X}'_{it}\boldsymbol{\alpha}_3 + \alpha_4[FI_{it} * BB_{it}] + \varepsilon_{it} \tag{6}$$

where CA_{it} is the current account balance in percentage of GDP in country i at time t, BB_{it} is the government budget balance in percent of GDP, $\mathbf{X}_{it}$ is a vector of control variables (see *infra*); FI_{it} denotes fiscal institution (fiscal rules or budgetary frameworks); δ_t, γ_i denote time and country effects, respectively; and ε_{it} is a disturbance term satisfying standard conditions of zero mean and constant variance.

If the coefficient α_1 is positive and statistically significant (at least at the 5 percent level of confidence), then there is evidence of twin deficits. The coefficient α_2 measures the direct effect of fiscal institutions on the current account. Its sign is ambiguous, except with revenue rules and debt rules for which it is expected to be unambiguously negative. The coefficient on the interaction term between the budget balance variable and the fiscal institution variable α_4 captures the indirect effect of fiscal institutions on the current account. It assesses the possibility that the impact of the budget balance on the current account balance differs depending on the existence of more stringent or well-designed fiscal rules. The sign of the indirect effect is not firmly settled, but it is expected to be positive in cases where fiscal rules are weak (for example expenditure rules in resource-rich countries) and the degree of compliance is the lowest (budget balance rules). The overall effect of fiscal institutions on the relationship between the current account and the budget balance is measured by $\alpha_1 + \alpha_4 FI$ (FI being the sample average of the fiscal institution variable considered).

The control variables are chosen among fundamental determinants of the current account balance (Barnes et al., 2010; Chinn and Ito, 2007; Chinn and Prasad, 2003; Gruber and Kamin, 2007; Lane and Milesi-Ferretti, 2012; Lee et al., 2008; Medina et al., 2010). The selection of variables depends on data availability in our large sample (see sub-section 4.2). The latter explain why national saving may exceed or fall short of national investment. Apart from the budget balance, the relevant variables are the following:

- Demography is a prime determinant of private saving. A higher age dependency ratio is expected to decrease the current account balance, because a higher share of young and old (inactive) people relative to working-age population is associated with a lower saving rate. Indeed, the life-cycle theory of consumption and saving predicts that the young borrow and the old dissave, while the middle-age people save for retirement.
- GDP per capita has a positive impact on the current account balance. In the early stage of economic development, a country needs to borrow abroad because the national saving rate is too low to finance investment. In contrast, rich countries can afford to lend to the rest of the world. Also, at lower levels of GDP per capita, a higher expected future income (if economic convergence works) raises current consumption, which in turn reduces the current account balance. This effect can be captured by relative income, which is a country's GDP per capita relative to the U.S. level.
- GDP growth is expected to have a negative impact on the current account balance. This effect depends on the import intensity of aggregate demand components.
- Net foreign assets (*NFA*) have a positive effect on the current account balance if the country has a net creditor position (*NFA* > 0), and as a result, it receives net investment income. In theory, the relation can be negative as well if, with the accumulated stock of foreign assets, a wealthier country can afford to import more and run current account deficits (Chinn and Ito, 2007; Gruber and Kamin, 2007). The lagged NFA-to-GDP ratio enters Equation (6) since the net investment position generates flows of income with a time lag (and to avoid correlation with the dependent variable).
- Oil balance is generally preferred to oil prices as a control variable because the latter affect countries differently depending on whether they are producer/exporting or importing countries. A positive oil balance helps improves the current account balance. The impact on the current account is not one-for-one because it also depends on how the non-oil balance reacts to oil price shocks (Gruber and Kamin, 2007).
- A positive change in the terms of trade leads to an improvement in the current account balance if it leads to an increase in the value of exports relative to that of imports of goods and services, and the price elasticities of import and export volumes are high.

We add dummy variables among the regressors to account for some country/time specific effects related to the exchange rate regime and financial crises (the Asian crisis, a banking crisis, and a sovereign debt crisis). Since corrections of external imbalances are more difficult when the nominal exchange rate is not allowed to adjust to market forces, the coefficient of the dummy variable for a fixed exchange rate regime is presumably negative.[12] The sign of the coefficient of a crisis dummy variable is positive (as explained and confirmed by Gruber and Kamin, 2007). In general, during a financial crisis, there is a disrup-

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[12] From this point of view, a comparison of adjustments in East Asia and in the Euro area is telling (IMF, 2014). In the same vein, Lane and Milesi-Ferretti (2012) had found that the correction of large current account deficits mostly relied on expenditure reduction in countries with an exchange rate peg.

tion in the access to international capital markets, which impedes foreign borrowing and makes countries implement faster adjustment programmes to correct external imbalances.

Equation (6) is first estimated using the least-squares dummy variable (LSDV) estimator – this will serve as our baseline. In the baseline estimates, we also check results with or without country and/or time effects. Standard errors are clustered at the country level and robust to autocorrelation and heteroskedasticity.

In the estimates with fiscal rules, we do not run the regressions with time and country fixed effects (FE), and this for several reasons: we want to focus on fiscal institutions which do not vary much over time; we test their influence by various groups of countries; many other works also exclude country and time fixed effects (Barnes et al., 2010; Chinn and Prasad, 2003; Lane and Milesi-Ferretti, 2012; Lee et al., 2008) or country fixed effects (Chinn and Ito, 2007; Gruber and Kamin, 2007; Medina et al., 2010) on the grounds that using FE estimators abstract from too much of the cross-country variation in the current account balances; and finally, our main conclusions about the role of fiscal rules remain valid when fixed effects are introduced.

As robustness checks for unbalanced panels, endogeneity issues, cross-section dependence and outliers, we employ alternative estimators as well. More specifically, Equation (6) is also estimated using the bias-corrected least-squares dummy variable (LSDV-C) estimator by Bruno (2005).[13] We also run panel instrumental variable (IV) estimations, where in the first stage of the 2SLS procedure we instrument the potentially endogenous budget balance-to-GDP ratio with military spending.[14]

Moreover, the model described above is reduced-form and does not allow making causal statements or even quantifying the clean effect of budget balances on the current account, meaning that the use of instruments is required. While adding covariates present in our vector $\boldsymbol{X}_{it}$ partly corrects for these biases, endogeneity can still arise from other omitted variables (unobserved heterogeneity and selection effects), measurement errors in variables and reverse causality (simultaneity). Since causality can run in both directions, some of the right-hand-side regressors may be correlated with the error term. In this respect, the first-differenced Generalized Method of Moments (GMM) estimator can behave poorly if time series are persistent. Hence, we use the more efficient system GMM estimator that exploits stationarity restrictions. This method jointly estimates Equation (6) in first differences, using as instruments lagged levels of the dependent and independent variables, and in levels, using as instruments the first differences of the regressors (Arellano and Bover, 1995; Blundell and Bond, 1998).[15] GMM estimators are asymptotically unbiased, and compared with ordinary least squares or fixed effects (within-group) estimators, exhibit the smallest bias and variance (Arellano and Bond, 1991). As far as information on the choice of lagged levels (differences) used as instruments in the difference (level) equation, as work by Bowsher (2002) and, more recently, Roodman (2009) have indicated, when it comes to moment conditions (as thus to instruments) more is not always better. The GMM estimators are likely to suffer from "overfitting bias" once the number of instruments approaches (or exceeds) the number of groups/countries (as a simple rule of thumb). In the present case, the validity of instruments was examined using Sargan's test of overidentifying restrictions. Intuitively, the system GMM estimator does not rely exclusively on the first-differenced equations, but exploits also information contained in the original equations in levels.

Finally, we inspect the potential role played by outliers in our sample using the Method of Moments that fits the efficient high breakdown estimator proposed by Yohai (1987). We also account for outliers and trimmed the sample to extreme values of the dependent variable, and we exclude current account values above 15 percent of GDP in absolute value.

4.2. Data and stylized facts

The description of variables is detailed in Table A2 in Appendix A. Our full sample, for which the macro data come from the IMF World Economic Outlook database, covers 193 countries over the period 1980–2016, which yields up to a maximum of 7,141 observations. However, our FR sample with fiscal rule indices, that we built using the IMF Fiscal Rules Dataset (Schaechter et al., 2012) covers 65 countries over the period 1985–2015, which gives a maximum of 2015 observations.[16] Our country sample covers 34 AEs, 18 EMEs, and 13 LICs (listed in Table A3). Given data availability for each variable, the full sample shrinks to 2477 observations while the FR sample is reduced to 1518 observations.

Some explanations of how the dataset was built are warranted.

- *Macroeconomic variables.* Most of the macroeconomic data were retrieved from the World Economic Outlook Database (vintage April 2019) and completed with some International Financial Statistics (also April 2019). Additionally, data for the government debt variable come from the IMF Global Debt Database (Mbaye et al., 2018). It is general government debt (*gg*) in percent of GDP, and for countries with some missing observations, we followed the approach used by Perotti (1999) by multiplying the value of *central* government debt (*cg*) by the ratio *gg*/*cg* in the last year when *gg* is known.

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[13] Kiviet (1995) used asymptotic expansion techniques to approximate the small sample bias of the standard LSDV estimator for samples where N is small or only moderately large. Bruno (2005) extended the bias approximation formulas to accommodate unbalanced panels with a strictly exogenous selection rule.

[14] We thank Roland Winkler, our discussant of the paper at the CEPS conference, for suggesting this robustness-checking strategy. Military spending data are from Miyamoto et al. (2019).

[15] We equally tried estimating Equation (6) with a difference GMM estimator but decided against it because the lagged dependent variable was not significant. Moreover, the tenor of the results is very similar to the system GMM. More specifically, we run the two-step system-GMM estimator with Windmeijer standard errors. The significance of the results is robust to different choices of instruments and predetermined variables.

[16] The updated version of the dataset contains 96 countries. But we retain 65 countries which had at least one of the rules in place during the period of analysis. For a detailed presentation, see Lledó et al. (2017).

- *Dummy variable for fixed exchange rate regime (peg).* We have constructed a dummy variable that takes on the value of one if a country has an exchange rate regime classified as peg and zero otherwise. We used the classification from Shambaugh (2004) updated in February 2015, and for the year 2015, we used the dataset built by Ilzetzki et al. (2019) paying special attention to differences in methodology between both classifications.[17]
- *The dummies for banking crisis and sovereign debt crisis* take on the value one if there is a crisis and zero otherwise. They are constructed using the dataset by Laeven and Valencia (2018), who define banking crises as systemic crises, and sovereign debt crises as episodes of default and restructuring.
- *Resource-rich countries*: we used a dataset by Bova et al. (2018) to include a dummy variable that takes the value of one if a country is a commodity exporter (oil, gas and metals), zero otherwise.
- *Fiscal rules.* We computed an index for each type of fiscal rule: expenditure rule index (ERI), revenue rule index (RRI), budget balance rule index (BBRI), and debt rule index (DRI). To do so, we looked at the existence of a rule (value of one, zero otherwise), we considered whether it was national (value of 0), supranational (1) or both (2), and we added up their characteristics (both for national and supranational rules), namely: monitoring of compliance outside government (1); formal enforcement procedure (1); coverage (2 for general government, 1 for central government, 0.5 for different levels of government); legal basis (5 for constitutional basis, 4 for international treaty, 3 for statutory basis, 2 for coalition agreement, 1 for political commitment); and well-specified escape clause (1). All features have equal weights, as it has generally been done in the literature (e.g., Bergman et al., 2016; Caselli and Reynaud, 2019; Cordes et al., 2015; Schaechter et al., 2012).[18] Each index is then normalized so that it ranges between 0 and 1.
- *Fiscal council (FC).* It is a dummy variable that we constructed using the IMF Fiscal Council Dataset (Debrun and Kinda, 2017). It takes the value of one if a fiscal council exists, zero otherwise.[19]
- *Global fiscal rule index (GFRI).* This index is the main variable of our analysis. It is the sum of the four indices (ERI, RRI, BBRI, DRI), plus some general features (in some cases, both national and supranational), which concern supporting procedures/institutions (multi-year expenditure ceilings, budget assumptions, implementation, transparency and accountability), the definition of the target (in cyclically adjusted terms for stabilization) and the exclusion of budget items (investment). It is also normalized to range from 0 to 1. It measures how well-designed fiscal rules are to deliver better budgetary outcomes.

The descriptive statistics for macroeconomic variables (Table A4) and FR indices (Table A5) are presented in Appendix A. Correlations among the variables include in the baseline regression are displayed in Table B2 (Online Appendix B). With the full cross-sectional dimension taken into account, the correlation between the current account balance and the budget balance is 0.48 in the full sample and 0.32 in the FR sample.

For individual countries, however, such correlation is not necessarily very robust. This may be illustrated by the inspection of the current account balance and budget balance for eight selected countries (see Fig. A1 in Appendix A): Netherlands, Canada, Japan and Greece among AEs, Chile and Poland among EMEs, Bangladesh and Ghana among LICs. Three of these countries are resource-rich countries (Canada, Chile, and Ghana), and one country suffered much during the euro area crisis (Greece). The correlation is low in AEs countries with current account surpluses: Japan (0.08), Netherlands (0.10). Conversely, it is high in resource-rich countries: Ghana (0.72), Canada (0.58) and Chile (0.29).

These differences across individual countries may well be due to the existence and design of fiscal rules. For instance, among these eight countries, the correlation between the current account and the budget balance is low in countries where the average GFRI is higher over the full period: Netherlands (0.44), Poland (0.23) and Japan (0.10). Conversely, the correlation is high in Canada where the GFRI is low (0.06) and in countries (Bangladesh, Ghana) where there are no fiscal rules at all (or no information about them). As for Greece and Chile, they stand as two exceptions: the correlation between the current account balance and the budget balance is similar, but the value of GFRI is higher in Greece (0.25) than in Chile (0.05). It remains that this does not mean that compliance with the rules is stronger in the former than in the latter.

The average of the GFRI in the FR sample is 0.165 (Table A5). It is higher in AEs (0.22) than in LICs (0.13) and EMEs and resource-rich countries (0.09). By type of rules, it is the highest for BBRI (0.235) and DRI (0.18) than for ERI and RRI (0.07). The value of GFRI has increased steadily over time (Fig. 1), and strikingly, fiscal rule indices have much increased after the global financial crisis, and above all, ERI. As for fiscal councils (FC), they have become more widespread after 2009 too.

5. Empirical results

5.1. Baseline and fiscal rules

We start with estimating a series of baseline specifications, comparing the full sample and the FR sample, and testing the robustness of the results to the inclusion of country and time fixe effects (Table 1). The key variable, the budget balance,

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[17] In Shambaugh (2004), the classification as peg is based on either the currency stays within a 2% band of fluctuation against the base currency or it has zero volatility in all months except for a one off devaluation.
[18] An exception is found in Badinger et al. (2017) who use the algorithm POSET developed by Badinger and Reuter (2015). At the end, the latter acknowledge that their index and an index with equal weights give similar results.
[19] We do not employ an index measuring the strength of fiscal councils, because despite a positive effect of the existence of fiscal councils on rule compliance, there is no effect of an index of strength on rule compliance (Beetsma et al., 2019).
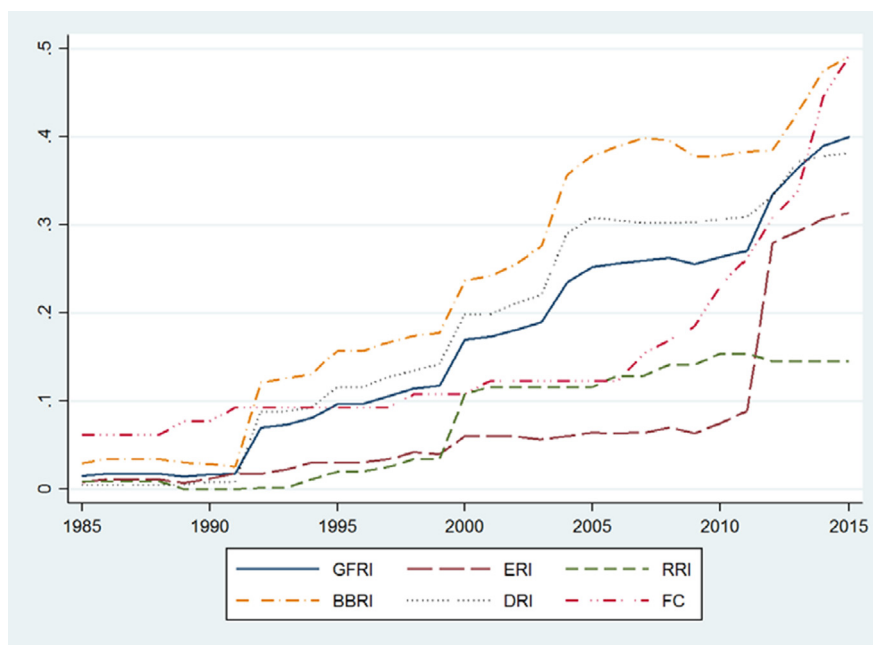
Fig. 1. **Evolution of fiscal rules** Source: own calculations using Schaechter et al. (2012), 2016 vintage.

turns out to have a positive and significant effect on the current account balance, and this is a robust result to different specifications. More precisely, we find that the size of the estimated coefficient on the budget balance is between 0.29 and 0.45 in the full sample, which is in line with other results in the literature and confirms the twin-deficits hypothesis. However, the size of the coefficient is much lower in the FR sample, ranging from 0.10 to 0.25.

The other determinants are found to have a significant effect as well, with the expected sign, although there are some exceptions. First, banking crises reduce the current account balance whereas sovereign crises improve it. We suspect that the former kind of crisis is also a proxy for a pattern of excessive growth of credit to the private sector, which can cause an expansion of domestic private spending, and hence current account deficits. As for sovereign crises, the sign is positive as expected, and this confirms the idea that during a sovereign debt restructuring, the adjustment in the current account also relies on a reduction in government interest payments (an improvement in the NFI balance).[20]

With the introduction of country fixed effects (FE), the estimated coefficient of some variables becomes smaller (budget balance), insignificant (NFA) or larger (oil balance). This was also found in Gruber and Kamin (2007) who explain that variables such as the budget balance and NFA are likely to show more variation across countries than over time, so that the inclusion of country FE reduces their residual effect on the current account. In contrast, the larger coefficient of the oil balance suggests that this variable has more time-variation than cross-country variation. The reversed sign of NFA (in the full sample only and not significant) can illustrate wealth effects whereby richer countries can afford to import more (see the discussion supra). As for the reverse sign in the age dependency ratio (in the FR sample and not significant), it suggests that aging population (such as in Germany or Japan for example) tend to save more depending on the characteristics of the pension system.

These baseline results constitute a benchmark for our subsequent, core empirical results. Table 2 presents the results of estimates including the same set of current account determinants as in Table 1, completed by the global fiscal rule index (GFRI), and the inclusion one at a time of the index of each kind of fiscal rule or institution to examine their marginal effect. We find that the direct effect of fiscal rules on the current account is positive and significant (the estimated coefficient on the GFRI variable is 1.84), which is consistent with the theoretical prediction: fiscal rules improve the current account; and the existence of fiscal council as well (coefficient of 1.29). This may well be due to the fact that well-designed fiscal rules and the presence of fiscal councils improve fiscal outcomes in the first place. Our theoretical analysis pointed out possible exceptions, which are illustrated in the data indeed: we found a negative direct effect of a higher index of revenue rules (not statistically significant though) and debt rules (-3.07) on the current account balance. We explain it by the lack of effectiveness of these two kinds of fiscal rules.

As for indirect effects, that is the influence of fiscal rules on the effect of the budget balance on the current account balance, one needs to compute the value of the interaction term using the sample mean of each fiscal rules index (Table A5) and add it to the estimated coefficient of the budget balance variable. For example, given the sample mean of ERI (0.074), the

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[20] Afonso et al. (2019) point out this mechanim in the case of Greece.

Fig. A1. Current account balance and budget balance in selected countries.

influence of expenditures rules is 0.13 + (1.21 × 0.074) = 0.22. Thus, expenditure rules increase the impact of the budget balance on the current account balance by 1.21 (interaction term). This is also the case with budget balance rules. This can be explained by the fact that expenditure rules are the least strong fiscal rules and the degree of compliance with budget balance rules is the lowest. In contrast, revenue rules and debt rules reduce the impact of the budget balance on the current account balance. The former are strong rules and the latter have the highest degree of compliance. This is in line with the theoretical prediction that more stringent or well-designed fiscal rules may increase the likelihood of Ricardian equivalence and reduce the twin-deficits relationship.

Table 1
Baseline results.

Variables	Full sample				FR sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Budget Balance	0.44***	0.45***	0.29***	0.29***	0.23***	0.25***	0.11***	0.10***
	(0.046)	(0.047)	(0.042)	(0.045)	(0.043)	(0.044)	(0.030)	(0.031)
Age dependency ratio	−0.09***	−0.09***	−0.05***	−0.07***	−0.07***	−0.07***	0.01	0.02
	(0.009)	(0.010)	(0.017)	(0.019)	(0.012)	(0.012)	(0.020)	(0.022)
Relative income	0.03***	0.03***	0.01	0.03***	0.03***	0.03***	−0.03***	−0.02*
	(0.004)	(0.004)	(0.011)	(0.013)	(0.004)	(0.005)	(0.009)	(0.011)
GDP growth	−0.10**	−0.10**	−0.10**	−0.11**	−0.16***	−0.17***	−0.20***	−0.23***
	(0.049)	(0.052)	(0.049)	(0.052)	(0.059)	(0.061)	(0.057)	(0.059)
Lagged NFA	0.01***	0.01***	−0.01	−0.00	0.01***	0.01***	0.01	0.01
	(0.002)	(0.002)	(0.008)	(0.008)	(0.002)	(0.002)	(0.008)	(0.008)
Oil balance	0.12***	0.12***	0.45***	0.45***	0.17***	0.17***	0.41***	0.42***
	(0.010)	(0.010)	(0.043)	(0.044)	(0.013)	(0.013)	(0.068)	(0.070)
Change in the terms of trade	0.06***	0.06***	0.03**	0.03**	0.02*	0.03*	0.01	0.01
	(0.016)	(0.016)	(0.013)	(0.013)	(0.015)	(0.015)	(0.012)	(0.012)
Peg	−0.75***	−0.76***	−0.55**	−0.58**	−1.25***	−1.27***	−0.42	−0.63*
	(0.272)	(0.280)	(0.278)	(0.286)	(0.275)	(0.275)	(0.357)	(0.345)
Asian crisis	5.00***	5.17***			6.02***	5.86***		
	(1.180)	(1.230)			(1.707)	(1.753)		
Banking crisis	−2.24***	−1.49**	−1.78***	−1.34**	−2.98***	−2.15***	−2.57***	−2.16***
	(0.719)	(0.739)	(0.549)	(0.544)	(0.817)	(0.830)	(0.619)	(0.623)
Sovereign debt crisis	1.95***	1.95***	1.15*	1.37**	0.75	0.71	−0.16	0.16
	(0.740)	(0.736)	(0.687)	(0.696)	(1.020)	(1.009)	(0.874)	(0.856)
Observations	2,477	2,477	2,477	2,477	1,518	1,518	1,518	1,518
R-squared	0.44	0.45	0.71	0.72	0.41	0.42	0.71	0.72
Time FE	No	Yes	No	Yes	No	Yes	No	Yes
Country FE	No	No	Yes	Yes	No	No	Yes	Yes

Notes: robust standard errors clustered at the country level in parentheses.
*, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively.

All considered, the GFRI increases the impact of the budget balance on the current account balance, although the effect is not statistically significant, which is probably due to the various effects of the different types of fiscal rules. Still, one needs to make a more detailed inspection of specific characteristics of fiscal rules (Table 3).

Fiscal rules with formal enforcement procedure, a strong legal basis and implementation monitoring by an independent body have a strong positive direct impact on the current account balance, which is not surprising, because these features aim at reinforcing compliance with rules and hence their effectiveness to improve fiscal outcomes. In contrast, and surprisingly, transparency and accountability have a negative impact on the current account balance: in this case, a reduction in uncertainty about future developments of fiscal policy may reduce precautionary saving or stimulate private investment.

With regard to the indirect effects of specific characteristics of fiscal rules, only monitoring compliance outside government and transparency and accountability reduce the influence of the budget balance on the current account balance. Looking at such details in the fiscal rules enable us to understand the reason why Badinger et al. (2017) find that the twin-deficits relationship disappears in countries with the most stringent fiscal rules. In contrast, and surprisingly, a formal enforcement procedure, a strong legal basis and monitoring implementation by an independent body reinforce the twin-deficits relationship. It could be due to the fact that these features have no influence on Ricardian behaviour, because fiscal rules have become more complex.

5.2. Robustness

We take into account various specific conditions: the income group of countries, the level of debt, and the macroeconomic context. We have also checked our baseline results using alternative estimators.

Table 4 breaks the sample down into several groups of countries.[21] In the presence of fiscal rules (GFRI), twin deficits do not prevail in EMEs, but they do in LICs, resource-rich countries and countries with a fixed exchange rate, most likely because there is a higher share of liquidity-constrained households in population of LICs (Chinn and Ito, 2007), fiscal policy is procyclical in resource-rich countries (Bova et al., 2018), and the fiscal multiplier is larger in countries with a peg (Born et al., 2013).

Well-designed fiscal rules help improve the current account balance in AEs (especially ERs, BBRs and FCs). Nonetheless, in LICs, fiscal rules worsen much the current account balance (especially BBRs and DRs), and the twin-deficits relationship is the strongest with RRs (the overall impact of the budget balance on the current account balance being 0.42). In fact, RRs are

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[21] Results by income group of countries and type of fiscal rules and institutions are displayed in Table B3 in the Online Appendix B.

Table 2
Adding fiscal rules.

Variables	(1) Baseline	(2) GFRI	(3) ERI	(4) RRI	(5) BBRI	(6) DRI	(7) FC
Budget Balance	0.23***	0.16***	0.13***	0.27***	0.06	0.29***	0.24***
	(0.043)	(0.053)	(0.037)	(0.045)	(0.059)	(0.051)	(0.045)
Age dependency ratio	−0.07***	−0.07***	−0.06***	−0.07***	−0.07***	−0.07***	−0.07***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)
Relative income	0.03***	0.03***	0.03***	0.03***	0.03***	0.03***	0.02***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GDP growth	−0.16***	−0.16***	−0.16***	−0.17***	−0.16***	−0.17***	−0.16***
	(0.059)	(0.060)	(0.057)	(0.058)	(0.058)	(0.057)	(0.059)
Lagged NFA	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Oil balance	0.17***	0.17***	0.17***	0.17***	0.18***	0.16***	0.17***
	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)	(0.013)	(0.013)
Change in ToT	0.02*	0.02*	0.03**	0.03*	0.03*	0.03*	0.02*
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)
Peg	−1.25***	−1.42***	−1.33***	−1.31***	−1.42***	−0.72**	−1.39***
	(0.275)	(0.294)	(0.271)	(0.306)	(0.275)	(0.282)	(0.279)
Asian crisis	6.02***	6.11***	5.03***	5.87***	5.84***	5.40***	6.18***
	(1.707)	(1.680)	(1.551)	(1.708)	(1.676)	(1.734)	(1.708)
Banking crisis	−2.98***	−3.04***	−2.73***	−2.92***	−3.16***	−2.89***	−2.92***
	(0.817)	(0.807)	(0.768)	(0.815)	(0.794)	(0.813)	(0.801)
Sovereign debt crisis	0.75	0.85	0.85	0.76	0.88	0.48	0.80
	(1.020)	(1.034)	(1.045)	(1.008)	(1.055)	(1.005)	(1.028)
GFRI		1.84**					
		(0.864)					
bb*GFRI		0.34					
		(0.221)					
ERI			7.41***				
			(0.887)				
bb*ERI			1.21***				
			(0.222)				
RRI				−0.03			
				(0.620)			
bb*RRI				−0.23***			
				(0.069)			
BBRI					2.18***		
					(0.643)		
bb*BBRI					0.54***		
					(0.158)		
DRI						−3.07***	
						(0.655)	
bb*DRI						−0.32**	
						(0.138)	
FC							1.29***
							(0.382)
bb*FC							0.07
							(0.096)
Observations	1,518	1,518	1,518	1,518	1,518	1,518	1,518
R-squared	0.41	0.41	0.44	0.41	0.42	0.42	0.42

Notes: No FE. Robust standard errors clustered at the country level in parentheses.
*, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively.

widespread and stringent in LICs. Still, this kind of rules is the least effective (Beetsma et al., 2019; Bergman et al., 2016). The presence of a fiscal council improves noticeably the current account in these countries, but strangely enough, the twin-deficits relationship is also reinforced. Maybe such a fiscal institution is not successful in supporting fiscal rules in these countries. In contrast, the existence of a fiscal council in resource-rich countries deteriorates the current account and reduces much the pattern of twin deficits (the overall impact of the budget balance on the current account being reduced to 0.24). This is most likely because such institutions help mitigate the procyclical bias in fiscal policy in these countries. As far as EMEs are concerned, there is no evidence of twin deficits, and on the contrary, there is evidence of twin divergence in presence of fiscal councils (the effect of the budget balance on the current balance is −0.04), which can be explained by the fact that FCs foster compliance with rules in general (Beetsma et al., 2019; Eyraud et al., 2018).

Table 3
Fiscal rules and specific characteristics.

Variables	(1) Monitoring compliance outside government	(2) Formal enforcement procedure	(3) Legal basis	(4) Well-designed escape clause	(5) Independent body monitors implementation	(6) Transparency and accountability
Budget Balance	0.29***	0.06	0.09*	0.20***	0.23***	0.27***
	(0.049)	(0.048)	(0.053)	(0.047)	(0.044)	(0.047)
Age dependency ratio	−0.07***	−0.06***	−0.07***	−0.07***	−0.07***	−0.08***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Relative income	0.03***	0.03***	0.03***	0.03***	0.03***	0.02***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GDP growth	−0.16***	−0.15**	−0.15***	−0.16***	−0.16***	−0.16***
	(0.059)	(0.060)	(0.059)	(0.059)	(0.059)	(0.060)
Lagged NFA	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Oil balance	0.17***	0.18***	0.18***	0.17***	0.17***	0.17***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Change in ToT	0.03*	0.03*	0.03*	0.02*	0.03*	0.03*
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Peg	−1.26***	−1.75***	−1.44***	−1.26***	−1.33***	−1.38***
	(0.298)	(0.301)	(0.292)	(0.307)	(0.277)	(0.278)
Asian crisis	5.78***	5.59***	5.88***	6.07***	6.19***	5.60***
	(1.693)	(1.627)	(1.631)	(1.688)	(1.708)	(1.710)
Banking crisis	−2.89***	−2.97***	−3.07***	−3.03***	−3.00***	−3.03***
	(0.827)	(0.798)	(0.804)	(0.812)	(0.803)	(0.813)
Sovereign debt crisis	0.73	0.90	0.92	0.78	0.71	0.83
	(1.015)	(1.048)	(1.043)	(1.026)	(1.028)	(1.032)
Compliance_index	−0.88					
	(0.810)					
bb_Compliance_index	−0.36**					
	(0.173)					
Enforcement_index		6.95***				
		(1.237)				
bb_Enforcement_index		1.25***				
		(0.364)				
Legal_index			2.86***			
			(0.941)			
bb_Legal_index			0.64***			
			(0.246)			
Escape_index				0.66		
				(0.922)		
bb_Escape_index				0.21		
				(0.234)		
Implementation					1.40***	
					(0.397)	
bb_Implementation					0.21**	
					(0.107)	
Transparency						−2.14***
						(0.368)
bb*Transparency						−0.39***
						(0.083)
Observations	1,518	1,518	1,518	1,518	1,518	1,518
R-squared	0.41	0.43	0.42	0.41	0.42	0.42

No FE. Standard errors in parentheses.
*, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively.

Speaking of twin divergence, we did some other robustness checks by examining the influence of fiscal rules depending on the level of public debt and external debt (Table 5).[22] We have retained the threshold of 35% of GDP under which the level of debt is low, and the threshold of 90% of GDP above which the level of debt is considered high, following Nickel and Vansteenkiste (2008), Hürtgen and Rühmkorf (2014) and Nickel and Tudyka (2014).

Without fiscal rules (columns (2)-(5) of Table 5), the twin-deficits relationship is twice as strong when public debt is high as when it is low, and more than three times as strong when external debt is high as when it is low. We deem this as the result of higher interest payments paid to the rest of the world, precisely the "NFI effect" that we mentioned in Section 2. Nevertheless, well-designed fiscal rules and institutions (columns (7)-(10)) make the Ricardian effect dominate the NFI effect

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[22] Given that data for external debt come from the WDI of the World Bank, there are no observations for AEs.

Table 4
By group of countries.

Variables	(1) Baseline	(2) All countries	(3) AEs	(4) EMEs	(5) LICs	(6) Excl. resource-rich countries	(7) Resource-rich countries	(8) Float	(9) Peg
Budget Balance	0.23***	0.16***	0.09	0.04	0.39**	0.12*	0.44***	0.03	0.37***
	(0.043)	(0.053)	(0.075)	(0.073)	(0.195)	(0.077)	(0.090)	(0.058)	(0.112)
Age dependency ratio	−0.07***	−0.07***	−0.23***	−0.02	−0.14***	−0.04***	−0.14***	−0.00	−0.09***
	(0.012)	(0.012)	(0.050)	(0.019)	(0.052)	(0.011)	(0.033)	(0.011)	(0.020)
Relative income	0.03***	0.03***	0.06***	−0.13***	0.73*	0.03***	−0.01	0.03***	0.04***
	(0.004)	(0.004)	(0.006)	(0.022)	(0.448)	(0.005)	(0.008)	(0.004)	(0.008)
GDP growth	−0.16***	−0.16***	−0.08	−0.19***	−0.38***	−0.10	−0.46***	−0.18***	−0.21**
	(0.059)	(0.060)	(0.081)	(0.055)	(0.091)	(0.074)	(0.116)	(0.058)	(0.098)
Lagged NFA	0.01***	0.01***	0.00	0.15***	0.20***	0.01***	0.03	0.12***	0.00**
	(0.002)	(0.002)	(0.002)	(0.030)	(0.062)	(0.003)	(0.024)	(0.011)	(0.002)
Oil balance	0.17***	0.17***	0.20***	0.15***	0.14***	0.25***	0.21***	0.19***	0.18***
	(0.013)	(0.013)	(0.030)	(0.016)	(0.029)	(0.034)	(0.034)	(0.014)	(0.022)
Change in ToT	0.02*	0.02*	0.01	0.08***	0.02	0.01	0.07***	0.05**	0.01
	(0.015)	(0.015)	(0.048)	(0.024)	(0.018)	(0.016)	(0.023)	(0.021)	(0.020)
Peg	−1.25***	−1.42***	−1.46***	0.45	−2.13***	−1.56***	−0.82*		
	(0.275)	(0.294)	(0.408)	(0.473)	(0.787)	(0.325)	(0.478)		
Asian crisis	6.02***	6.11***	5.35**	3.67*		7.46***	0.16	3.42**	5.01
	(1.707)	(1.680)	(2.391)	(1.972)		(2.048)	(1.671)	(1.479)	(3.706)
Banking crisis	−2.98***	−3.04***	−4.62***	−2.18***	2.19	−3.52***	−0.36	−2.50***	−3.65***
	(0.817)	(0.807)	(0.999)	(0.819)	(2.237)	(0.996)	(0.860)	(0.727)	(1.089)
Sovereign debt crisis	0.75	0.85	−1.19	2.08**	−3.79*	−0.96	2.22**	1.59	0.80
	(1.020)	(1.034)	(0.836)	(0.986)	(1.972)	(1.702)	(1.056)	(1.598)	(1.065)
GFRI		1.84**	6.38***	−0.04	−7.20***	1.45	1.97	4.42***	−1.45
		(0.864)	(1.015)	(2.096)	(1.717)	(1.070)	(2.265)	(1.117)	(1.096)
bb*GFRI		0.34	0.71***	−0.57	−0.36	0.41	−0.65	0.97***	−0.42
		(0.221)	(0.233)	(0.469)	(0.494)	(0.279)	(0.495)	(0.253)	(0.278)
Observations	1,518	1,518	814	407	297	1,155	363	860	658
R-squared	0.41	0.41	0.44	0.50	0.39	0.41	0.56	0.58	0.42

Notes: No FE. Robust standard errors clustered at the country level in parentheses.
*, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively.

in the case of a high public debt, so that the twin-deficits relationship dies out at high levels of public debt, which is in line with findings by Hürtgen and Rühmkorf (2014). Even so, there is no evidence of twin divergence at high levels of public debt (the relationship between the current account and the budget balance is not found to be negative), in contrast to the conclusion in Nickel and Vansteenkiste (2008), and Nickel and Tudyka (2014). Incidentally, the GFRI variable has a negative impact on the current account at low levels of public and external debt. This may be due to lower levels of interest rates, which expands private spending.

Table 6 shows regression results depending on the macroeconomic environment. The twin-deficits relationship is stronger during recessions (column (2)), which is certainly due to higher fiscal multipliers during recessions (Auerbach and Gorodnichenko, 2012). Yet, well-designed fiscal rules and institutions seem to restrict the use of discretionary fiscal policy for stabilization purposes and improve the current account balance at the same time, so that twin deficits no longer prevail during recessions. It is worth noting though, that there seems to be a return of twin deficits (or "twin surpluses") since the global financial crisis. Indeed, after 2009, the impact of the budget balance on the current account balance has been stronger (0.39), even in the presence of fiscal rules (0.28). This trend is in all likelihood related to adjustment programmes that were implemented in quite a few countries to correct both internal and external imbalances, especially in the Euro area.

Table 7 reports the results of several robustness checks of the baseline model augmented by the global fiscal rule index (GFRI) applying different estimators and tools aiming at reducing the impact of outliers. They globally confirm that well-designed fiscal rules and institutions help improve the current account balance and increase the impact of the budget balance on the current account balance.[23] Expenditure rules, budget balance rules and fiscal councils improve the current account balance whereas debt rules deteriorate the current account balance. The twin-deficits relationship is increased with expenditure

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[23] We also used a specification without the NFA variable when the lagged dependent variable is added, because the effect of NFA could be absorbed in the lagged CA variable. Results were similar. The picture also remains unchanged if one uses these estimators to check the influence of each type of fiscal rules and institutions (Table B4 in the Online Appendix B).

[24] We have also investigated the role of real interest rates (a key determinant of private savings and investment) as a possible regressor. However, in most of the regressions (notably when including fiscal rules and fiscal institutions) the real interest rates turn out to be insignificant (see Tables B5-B6 in the Online Appendix B). Finally, using Driscoll-Kraay robust standard errors to cross-sectional dependencies and autocorrelation shows that the main link between the budget balance and the current account balance goes through (see Table B7).

Table 5
By level of debt.

Variables	(1) Baseline	(2) Low public debt	(3) High public debt	(4) Low external debt	(5) High external debt	(6) GFRI	(7) Low public debt	(8) High public debt	(9) Low external debt	(10) High external debt
Budget Balance	0.23***	0.20***	0.40***	0.08**	0.29***	0.16***	0.35***	0.18	0.14*	0.32**
	(0.043)	(0.058)	(0.117)	(0.033)	(0.103)	(0.053)	(0.088)	(0.148)	(0.080)	(0.135)
Age dependency ratio	−0.07***	−0.08***	−0.16***	−0.07***	−0.11*	−0.07***	−0.08***	−0.16***	−0.07***	−0.08
	(0.012)	(0.015)	(0.031)	(0.014)	(0.067)	(0.012)	(0.014)	(0.031)	(0.014)	(0.068)
Relative income	0.03***	0.00	0.02	−0.02	0.02	0.03***	0.00	0.02	−0.02	0.02**
	(0.004)	(0.006)	(0.015)	(0.034)	(0.013)	(0.004)	(0.006)	(0.015)	(0.036)	(0.012)
GDP growth	−0.16***	−0.35***	0.21	−0.19*	−0.42***	−0.16***	−0.39***	0.19	−0.22**	−0.37***
	(0.059)	(0.069)	(0.139)	(0.108)	(0.133)	(0.060)	(0.065)	(0.142)	(0.097)	(0.129)
Lagged NFA	0.01***	0.01***	0.08***	0.09**	0.04***	0.01***	0.02***	0.08***	0.11**	0.05***
	(0.002)	(0.002)	(0.019)	(0.044)	(0.008)	(0.002)	(0.002)	(0.020)	(0.047)	(0.008)
Oil balance	0.17***	0.18***	0.24***	0.14***	0.26***	0.17***	0.16***	0.23***	0.13***	0.25***
	(0.013)	(0.013)	(0.060)	(0.048)	(0.013)	(0.013)	(0.013)	(0.057)	(0.012)	(0.050)
Change in ToT	0.02*	0.03	0.12*	0.04*	0.05	0.02*	0.02	0.11	0.04*	0.01
	(0.015)	(0.018)	(0.070)	(0.020)	(0.081)	(0.015)	(0.018)	(0.072)	(0.019)	(0.079)
Peg	−1.25***	−0.29	−1.85***	−1.70***	−0.54	−1.42***	0.91*	−1.85**	−1.00**	−2.43***
	(0.275)	(0.510)	(0.684)	(0.454)	(0.767)	(0.294)	(0.531)	(0.789)	(0.490)	(0.689)
Asian crisis	6.02***	10.01***			−0.46	6.11***	10.03***			1.23
	(1.707)	(2.896)			(2.030)	(1.680)	(2.763)			(2.130)
Banking crisis	−2.98***	−3.24***	−2.86	−0.47	−3.79***	−3.04***	−3.39***	−2.72	−0.91	−3.39***
	(0.817)	(1.114)	(2.008)	(1.228)	(1.444)	(0.807)	(1.136)	(1.953)	(1.233)	(1.296)
Sovereign debt crisis	0.75	2.14***	1.87	2.33**	0.95	0.85	1.47*	1.63	1.92**	2.11
	(1.020)	(0.629)	(2.166)	(0.988)	(2.331)	(1.034)	(0.844)	(2.320)	(0.959)	(2.816)
GFRI						1.84**	−8.49***	4.21	−6.42***	9.93***
						(0.864)	(1.480)	(3.398)	(1.814)	(1.580)
bb*GFRI						0.34	−0.56**	1.01	−0.16	−0.11
						(0.221)	(0.255)	(0.650)	(0.222)	(0.393)
Observations	1,518	465	174	315	286	1,518	465	174	315	286
R-squared	0.41	0.58	0.73	0.56	0.46	0.41	0.62	0.73	0.58	0.52

No FE. Standard errors in parentheses. *, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively. Note: A low (high) level of debt is below (above) 35 (90% of GDP)

rules, budget balance rules and fiscal councils, and reduced with revenue rules and debt rules. Exceptions are the LSDV-C estimator and panel IV approach. The former does not yield any significant effect of any rule, whereas the latter strategy, accounting for possible endogeneity of the budget balance, and instrumenting it with military spending, yields insignificant results both in terms of instrumented budget balance and the impact of fiscal rules.[24]

Finally, we have re-run the baseline regression with fiscal rules, replacing the realized budget balance with its forecast as regressor. Forecasts are from the April t-1 WEO data, vintage of 2016. In fact, in principle, fiscal forecasts should account for the internalization of expectations of fiscal nature by agents. Results (Table B8 in the Online Appendix B) confirm the twin-deficits hypothesis and the interaction effects of the several fiscal rules still hold.

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[24] We have also investigated the role of real interest rates (a key determinant of private savings and investment) as a possible regressor. However, in most of the regressions (notably when including fiscal rules and fiscal institutions) the real interest rates turn out to be insignificant (see Tables B5-B6 in the Online Appendix B). Finally, using Driscoll-Kraay robust standard errors to cross-sectional dependencies and autocorrelation shows that the main link between the budget balance and the current account balance goes through (see Table B7).

Table 6
By macroeconomic conditions.

Variables	(1) Baseline	(2) Recessions	(3) Before 2009	(4) After 2009	(5) GFRI	(6) Recessions	(7) Before 2009	(8) After 2009
Budget Balance	0.23***	0.36**	0.18***	0.39***	0.16***	0.24	0.12*	0.28***
	(0.043)	(0.144)	(0.052)	(0.072)	(0.053)	(0.182)	(0.063)	(0.094)
Age dependency ratio	−0.07***	−0.04	−0.06***	−0.13***	−0.07***	−0.02	−0.06***	−0.12***
	(0.012)	(0.037)	(0.016)	(0.014)	(0.012)	(0.040)	(0.016)	(0.014)
Relative income	0.03***	0.02*	0.02***	0.04***	0.03***	0.01	0.02***	0.04***
	(0.004)	(0.009)	(0.005)	(0.006)	(0.004)	(0.009)	(0.005)	(0.006)
GDP growth	−0.16***	−0.22**	−0.22***	0.06	−0.16***	−0.21**	−0.21***	0.06
	(0.059)	(0.089)	(0.072)	(0.079)	(0.060)	(0.087)	(0.072)	(0.079)
Lagged NFA	0.01***	0.01**	0.02***	0.00	0.01***	0.01*	0.02***	−0.00
	(0.002)	(0.003)	(0.004)	(0.002)	(0.002)	(0.004)	(0.004)	(0.002)
Oil balance	0.17***	0.16***	0.19***	0.11***	0.17***	0.15***	0.19***	0.12***
	(0.013)	(0.035)	(0.016)	(0.015)	(0.013)	(0.036)	(0.017)	(0.015)
Change in ToT	0.02*	0.03	0.02	0.02	0.02*	0.01	0.02	0.02
	(0.015)	(0.043)	(0.017)	(0.024)	(0.015)	(0.044)	(0.017)	(0.024)
Peg	−1.25***	−2.29***	−1.33***	−0.79**	−1.42***	−3.68***	−1.31***	−1.35***
	(0.275)	(0.797)	(0.351)	(0.381)	(0.294)	(0.954)	(0.357)	(0.442)
Asian crisis	6.02***	6.52*	6.19***		6.11***	6.99**	6.20***	
	(1.707)	(3.522)	(1.740)		(1.680)	(3.261)	(1.727)	
Banking crisis	−2.98***	−2.88**	−3.16***	0.01	−3.04***	−2.67*	−3.18***	−0.01
	(0.817)	(1.386)	(0.863)	(3.577)	(0.807)	(1.391)	(0.854)	(3.257)
Sovereign debt crisis	0.75	1.78	0.65	0.34	0.85	2.30	0.65	0.65
	(1.020)	(1.448)	(1.226)	(1.074)	(1.034)	(1.619)	(1.242)	(1.118)
GFRI					1.84**	7.68***	0.40	3.98***
					(0.864)	(2.859)	(1.042)	(1.157)
bb*GFRI					0.34	0.44	0.35	0.46
					(0.221)	(0.558)	(0.289)	(0.288)
Observations	1,518	175	1,076	442	1,518	175	1,076	442
R-squared	0.41	0.38	0.39	0.57	0.41	0.41	0.39	0.58

Notes: No FE. Robust standard errors clustered at the country level in parentheses.
*, ** and *** denote statistical significance at the 10, 5 and 1 percent level, respectively.

Table 7
Robustness: different estimators.

Variables	(1) LSDV-C	(2) System GMM	(3) Outlier-robust	(4) OLS: CA <>-+15%	(5) Panel IV (RE) (bb = milit. sp)
Lagged Current account	0.62***				
	(0.021)				
Budget Balance	−0.01	0.13***	0.02	0.07	2.22
	(0.051)	(0.032)	(0.050)	(0.045)	(1.959)
Age dependency ratio	0.03	0.14***	−0.03***	−0.04***	0.07
	(0.022)	(0.034)	(0.008)	(0.008)	(0.100)
Relative income	−0.02***	−0.02***	0.04***	0.03***	−0.08
	(0.008)	(0.004)	(0.003)	(0.003)	(0.057)
GDP growth	−0.19***	−0.20***	−0.07*	−0.09*	−0.45*
	(0.020)	(0.012)	(0.041)	(0.054)	(0.276)
Lagged NFA	0.00	0.04***	0.07***	0.01***	0.01
	(0.006)	(0.003)	(0.008)	(0.002)	(0.024)
Oil balance	0.27***	0.51***	0.18***	0.16***	0.31***
	(0.017)	(0.018)	(0.011)	(0.009)	(0.100)
Change in ToT	0.03***	−0.01	0.01	0.02	−0.06
	(0.009)	(0.005)	(0.012)	(0.012)	(0.050)
Peg	−0.35	0.27	−1.09***	−0.90***	−0.97
	(0.318)	(0.356)	(0.228)	(0.255)	(1.420)
Asian crisis	0.34	0.21	2.62	5.22***	−1.43
	(0.715)	(0.844)	(1.883)	(1.713)	(2.276)
Banking crisis	−1.42**	−2.31***	−2.39***	−2.28***	−2.15**
	(0.573)	(0.278)	(0.569)	(0.646)	(0.948)
Sovereign debt crisis	0.21	−0.15	1.87***	1.22**	−2.39*
	(0.839)	(0.713)	(0.503)	(0.603)	(1.459)
GFRI	0.74	1.11***	2.98***	1.55**	−14.99
	(0.756)	(0.394)	(0.811)	(0.760)	(15.924)
bb*GFRI	0.13	0.02	0.65**	0.23	−5.17
	(0.140)	(0.115)	(0.270)	(0.176)	(4.925)
Observations	1,499	1,437	1,518	1,468	1183
R-squared				0.43	

Notes: Robust standard errors in parentheses.

Table A1
Expected effects of fiscal rules.

	Direct effects on the current account		Indirect effects Impact on the twin-deficits hypothesis (TDH)		No effect
	Positive	Negative	Reinforced TDH	Reduced TDH	
Fiscal rules (FR)	- FRs promote fiscal discipline (Tóth, 2019) and improve fiscal outcomes (Badinger & Reuter, 2015, 2017; Debrun & Kinda, 2017; Eyraud et al., 2018; Beetsma et al., 2019; Caselli and Reynaud, 2019) even after addressing endogenous voter preferences (Krogstrup & Wälti, 2008)	- Countries with a fixed exchange rate - Strong FRs reduce interest rates and output volatility (Badinger & Reuter, 2017) - FRs reduce sovereign risk premia (Hallerberg and Wolff, 2008; Eyraud et al., 2018)	- Weak in EMEs and LICs (Badinger & Reuter, 2015)	- Stronger Ricardian equivalence - Reduction in the use of discretionary fiscal policy (Badinger, 2009)	- FRs may lead to creative accounting (Milesi-Ferretti, 2003) - FRs are associated with biased fiscal or growth forecasts (Von Hagen, 2010; Gilbert & de Jong, 2017) - FRs have become more complex (Eyraud et al., 2018; Debrun & Jonung, 2019)
Expenditure rules (ER)	- ERs improve fiscal outcomes, reduce public investment in EMEs (Cordes et al., 2015) - ERs improve fiscal outcomes in LICs (Tapsoba, 2012)	- ERs make fiscal policy more predictable (Cordes et al., 2015)	- ERs do not reduce the procyclical bias in gov. spending in resource-rich countries (Bova et al., 2018) - Least strong FRs (Beetsma et al., 2019)	- Highest compliance (Cordes et al., 2015; Reuter, 2015) in AEs (Debrun & Jounung, 2019) - Stronger ERs reduce the procyclical bias in gov. expenditure (Holm-Hadulla et al., 2012)	
Revenue rules (RR)		Least effective FRs (Bergman et al., 2016; Beetsma et al., 2019)		Not widespread but strong (Bergman et al., 2016; Beetsma et al., 2019)	- Least widespread FRs (Badinger & Reuter, 2015) -Hardly used in LICs (Tapsoba, 2012)
Budget balance rules (BBR)	- Reduction in public expenditures and public debt (Azzimonti et al., 2016; Asatryan et al., 2018 - BBRs reduce the political business cycle in fiscal balances (Rose, 2006) - Most effective FRs in improving fiscal outcomes (Beetsma et al., 2019) despite endogeneity issues (Bergman et al., 2016; Heinemann et al., 2018) - BBRs improve fiscal outcomes in LICs (Tapsoba, 2012)		- Lowest compliance (Reuter, 2015), especially in EMEs (Debrun & Jounung, 2019) - Structural BBRs are complex, and complexity makes it more difficult to monitor compliance (Schaechter et al., 2012)	- Most stringent FRs in AEs (Badinger & Reuter, 2015)	
Debt rules (DR)		- DRs do not improve fiscal outcomes in LICs (Tapsoba, 2012) - DRs are ill-calibrated in LICs (Eyraud et al., 2018)		- Highest compliance (Reuter, 2015; 2019), in particular in EMEs (Debrun & Jounung, 2019)	
Fiscal councils (FC)	- Complements to FRs, FCs improve fiscal outcomes (Debrun & Kinda, 2017) - Strong budget institutions reduce the deficit bias when political fragmentation is strong (De Haan et al., 2013)	- FCs reduce uncertainty (Debrun & Kinda, 2017)		- FCs foster compliance with rules (Eyraud et al., 2018; Beetsma et al., 2019)	

6. Conclusion

In this paper we have revisited the twin-deficits relationship for a sample of 193 countries over the period 1980–2016 (full sample) and a sub-sample of 65 countries over the period 1985–2015 for which data on fiscal rules are available (FR

Table A2
Description of variables.

Name	Units	Source
Current account	% of GDP	IMF – WEO
Budget balance	% of GDP	IMF – WEO
Age dependency ratio	% of working age population	WB – WDI
Relative income	% of GDP, to the U.S., per capita	WB – WDI
GDP growth	%, in real terms	IMF – WEO
NFA	Net foreign assets, % of GDP	IMF – WEO
Oil balance	Share of total trade, %	IMF – WEO
Change in ToT	Terms of trade, % change	IMF – WEO
Public debt	General (central) government debt, % of GDP	Mbaye et al. (2018)
External debt	% of GDP	IMF – WEO
Peg	Fixed exchange rate regime	Shambaugh (2004) classification, 2015 vintage; Ilzetzki et al. (2019)
Asian Crisis	1997–2000, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand	
Banking Crisis	Systemic crises	Laeven and Valencia (2018)
Sovereign debt crisis	Episodes of default and restructuring	Laeven and Valencia (2018)
Recession	Episodes of negative GDP growth	
GFRI	Global fiscal rule index, normalized to one	Schaechter et al. (2012), 2016 vintage
ERI	Expenditure rule index, normalized to one	Schaechter et al. (2012), 2016 vintage
RRI	Revenue rule index, normalized to one	Schaechter et al. (2012), 2016 vintage
BBRI	Budget balance rule index, normalized to one	Schaechter et al. (2012), 2016 vintage
DRI	Debt rule index, normalized to one	Schaechter et al. (2012), 2016 vintage
FC	Fiscal council	IMF Fiscal Council Dataset
Compliance_index	Monitoring compliance outside government	Schaechter et al. (2012), 2016 vintage
Enforcement_index	Formal enforcement procedure	Schaechter et al. (2012), 2016 vintage
Legal_index	Legal basis (Political commitment, Coalition agreement, Statutory basis, International Treaty or Constitutional basis)	Schaechter et al. (2012), 2016 vintage
Escape_index	Well-designed escape clause	Schaechter et al. (2012), 2016 vintage
Implementation	Independent body monitors implementation	Schaechter et al. (2012), 2016 vintage
Transparency	Transparency and accountability	Schaechter et al. (2012), 2016 vintage

Table A3
Countries.

AEs	United States, United Kingdom, Austria, Belgium, Denmark, France, Germany, Italy, Luxembourg, Netherlands, Norway, Sweden, Switzerland, Canada, Japan, Finland, Greece, Iceland, Ireland, Malta, Portugal, Spain, Australia, New Zealand, Cyprus, Israel, Hong Kong SAR, Singapore, Czech Republic, Slovak Republic, Estonia, Latvia, Lithuania, Slovenia
EMEs	Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, Iran, Sri Lanka, India, Indonesia, Malaysia, Pakistan, Russia, Hungary, Croatia, Poland
LICs	Cameroon, Chad, Benin, Côte d'Ivoire, Kenya, Mali, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda, Burkina Faso
Resource-rich	Australia, Bolivia, Cameroon, Canada, Chad, Chile, Colombia, Ecuador, Ghana, Indonesia, Iran, Mali, Mexico, Nigeria, Norway, Peru, Russia

sample). We have examined the role of various fiscal rules and institutions: expenditure rules (ER), revenue rules (RR), balance budget rules (BBR), debt rules (DR), fiscal councils (FC), and specific characteristics of rules and institutions. We have used different estimators: least-squares dummy variable, bias-corrected least-squares dummy variable, system GMM, outlier-robust procedures and panel IV estimations.

Our main findings can be summarized as follows: First, the twin-deficits hypothesis holds notably in the presence of well-designed fiscal rules, and the impact of the budget balance on the current account balance is increased when an interaction term with a fiscal rule is considered. Second, the impact is increased by the presence of ERs, BBRs, a formal enforcement procedure, a strong legal basis and implementation monitoring by an independent body. Third, the impact is reduced with RRs, DRs, compliance monitoring, transparency and accountability. Fourth, the impact is eliminated at high levels of public debt (Ricardian effect) and during recessions. Fourth, there is twin divergence in emerging-market economies (EMEs) with FCs. Fifth, the twin-deficits relationship is strong in low-income countries (LICs), resource-rich countries, countries with a fixed exchange rate, and countries with a high level of external debt (net factor income effect). More generally, the relationship has increased after the global financial crisis. Sixth, ERs, BBRs and FCs help improve the current account. On the contrary, DRs, transparency and accountability deteriorate the current account.

Our results support the view that fiscal consolidation *per se* could be harmful without much benefit in terms of reducing external imbalances in countries that have implemented the most comprehensive set of fiscal rules and supporting institutions. Still, the very existence of such rules help improve the current account balance by promoting fiscal discipline and improving fiscal outcomes.

Table A4
Descriptive statistics Full sample (193 countries, 1980–2016) FR sample (65 countries, 1985–2015).

Variable	Obs	Mean	Std.Dev.	Min	Max
Current account	5948	−2.708	11.777	−242.188	106.836
Budget Balance	4683	−2.835	15.886	−557.499	125.135
Age dependency ratio	4215	66.232	20.72	16.452	119.139
Relative income	5726	22.294	33.08	0.205	272.963
GDP growth	3808	3.301	5.785	−109.833	80.964
Lagged NFA	3588	14.418	57.991	−813.519	802.702
Oil balance	3606	−32.673	20.904	−74.352	51.013
Change in ToT	3544	0.177	13.4	−108.699	294.027
Peg	7139	0.495	0.5	0	1
Asian crisis	7141	0.004	0.067	0	1
Banking crisis	7141	0.02	0.142	0	1
Sovereign debt crisis	7141	0.018	0.131	0	1
Variable	Obs	Mean	Std.Dev.	Min	Max
Current account	1926	−1.291	6.276	−84.105	26.059
Budget Balance	1608	−2.134	4.43	−32.034	40.34
Age dependency ratio	2015	61.224	19.658	33.17	111.883
Relative income	1907	41.758	42.373	0.46	199.68
GDP growth	1939	3.252	3.887	−54.283	28.99
Lagged NFA	1876	17.973	69.377	−98.342	802.702
Oil balance	1869	−34.664	13.24	−68.119	37.569
Change in ToT	1913	0.111	9.777	−68.91	72.692
Peg	2015	0.424	0.494	0	1
Asian crisis	2015	0.008	0.089	0	1
Banking crisis	2015	0.032	0.175	0	1
Sovereign debt crisis	2015	0.014	0.117	0	1
Public debt	1900	55.21	33.123	3.469	236.069
External debt	1322	89.898	138.026	0.763	1175.227
GFRI	2015	0.165	0.196	0	1
ERI	2015	0.074	0.169	0	1
RRI	2015	0.074	0.231	0	0.909
BBRI	2015	0.235	0.271	0	1
DRI	2015	0.183	0.243	0	1
FC	2015	0.151	0.358	0	1
Compliance_index	2015	0.133	0.194	0	1
Enforcement_index	2015	0.093	0.147	0	0.857
Legal_index	2015	0.163	0.192	0	1
Escape_index	2015	0.098	0.185	0	1
Implementation	2015	0.098	0.298	0	1
Transparency	2015	0.112	0.315	0	1

Table A5
Fiscal rule indices By sample (mean).

Sample	GFRI	ERI	RRI	BBRI	DRI	FC
All countries	0.165	0.074	0.0741	0.235	0.183	0.151
AEs	0.218	0.112	0.0476	0.323	0.234	0.213
EMEs	0.0897	0.0562	0.0088	0.122	0.0982	0.102
LICs	0.131	0.000539	0.234	0.161	0.165	0.0596
Resource-rich countries	0.0946	0.0336	0.0927	0.133	0.0849	0.125
Excluding resource-rich countries	0.188	0.0873	0.068	0.268	0.215	0.16
Floating exchange rate	0.105	0.0578	0.0207	0.159	0.101	0.119
Fixed exchange rate	0.247	0.0961	0.147	0.337	0.293	0.196
Low public debt	0.153	0.04	0.108	0.216	0.18	0.114
High public debt	0.135	0.0795	0.0318	0.203	0.135	0.158
Low external debt	0.11	0.0366	0.107	0.138	0.124	0.157
High external debt	0.215	0.11	0.0508	0.316	0.227	0.22
Before 2009	0.119	0.0365	0.0527	0.181	0.137	0.101
After 2009	0.326	0.203	0.147	0.417	0.34	0.344
Recessions	0.183	0.108	0.064	0.247	0.198	0.15

Hence, a major policy implication is that well-designed fiscal rules, fiscal councils and features that reinforce compliance with fiscal rules improve the current account balance, and stress the link between sound fiscal policies and more balanced current account imbalances, and this is particularly the case for advanced economies (AEs). Since around 70% of the AEs country group in our sample consists of EU countries, including also Euro area countries, it is important to see this result against the background of the EU guidelines regarding the Macroeconomic Imbalance Procedure, which defines a headline

indicator with indicative thresholds for the current account imbalance. From a policy perspective, our findings suggest that a simplification of the fiscal rules and an enhancement of compliance with the rules warrant consideration. Also, policy responses to tackle current account imbalances are equally needed in deficit countries and surplus countries.

In terms of future work, it would be interesting to investigate the elements of the government budget constraint that drive the twin deficits. Are these mainly taxes and their components or expenditures and their components? A more disaggregated analysis would add value to this literature and would be the natural next step to follow. Moreover, a possible extension could be the use of an alternative dynamic specification and using Jordà's (2005) local projection method or again by augmenting the analysis with geopolitical and country-specific risk measures.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jimonfin.2021.102506.

References

Abbas, A.S.M., Bouhga-Hagbe, J., Fatás, A., Mauro, P., Velloso, R.C., 2011. Fiscal policy and the current account. IMF Econ. Rev. 59, 603–629. https://doi.org/10.1057/imfer.2011.22.

Abiad, A., Leigh, D., Mody, A., 2009. Financial integration, capital mobility, and income convergence. Econ. Policy 24, 241–305. https://doi.org/10.1111/j.1468-0327.2009.00222.x.

Afonso, A., Huart, F., Jalles, J.T., Stanek, P., 2019. Assessing the sustainability of external imbalances in the European Union. World Econ. 42, 320–348. https://doi.org/10.1111/twec.12709.

Afonso, A., Martins, L., 2016. Monetary developments and expansionary fiscal consolidations: evidence from the EMU: monetary developments and expansionary fiscal consolidations. Int. J. Finance Econ. 21, 247–265. https://doi.org/10.1002/ijfe.1544.

Afonso, A., Rault, C., Estay, C., 2013. Budgetary and external imbalances relationship: a panel data diagnostic. J. Quant. Econ. 11, 45–71.

Algieri, B., 2013. An empirical analysis of the nexus between external balance and government budget balance: the case of the GIIPS countries. Econ. Syst. 37, 233–253. https://doi.org/10.1016/j.ecosys.2012.11.002.

Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Rev. Econ. Stud. 58, 277. https://doi.org/10.2307/2297968.

Arellano, M., Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. J. Econom. 68, 29–51. https://doi.org/10.1016/0304-4076(94)01642-D.

Asatryan, Z., Castellón, C., Stratmann, T., 2018. Balanced budget rules and fiscal outcomes: Evidence from historical constitutions. J. Public Econ. 167, 105–119. https://doi.org/10.1016/j.jpubeco.2018.09.001.

Auerbach, A.J., Gorodnichenko, Y., 2012. Measuring the output responses to fiscal policy. Am. Econ. J. Econ. Policy 4, 1–27. https://doi.org/10.1257/pol.4.2.1.

Azzimonti, M., Battaglini, M., Coate, S., 2016. The costs and benefits of balanced budget rules: lessons from a political economy model of fiscal policy. J. Public Econ. 136, 45–61. https://doi.org/10.1016/j.jpubeco.2016.03.001.

Bachmann, R., Sims, E.R., 2012. Confidence and the transmission of government spending shocks. J. Monet. Econ. 59, 235–249. https://doi.org/10.1016/j.jmoneco.2012.02.005.

Badinger, H., 2009. Fiscal rules, discretionary fiscal policy and macroeconomic stability: an empirical assessment for OECD countries. Appl. Econ. 41, 829–847. https://doi.org/10.1080/00036840701367556.

Badinger, H., Fichet de Clairfontaine, A., Reuter, W.H., 2017. Fiscal Rules and Twin Deficits: The Link between Fiscal and External Balances. World Econ. 40, 21–35. https://doi.org/10.1111/twec.12427.

Badinger, H., Reuter, W.H., 2017. The case for fiscal rules. Econ. Model. 60, 334–343. https://doi.org/10.1016/j.econmod.2016.09.028.

Barnes, S., Lawson, J., Radziwill, A., 2010. Current Account Imbalances in the Euro Area: A Comparative Perspective. OECD Econ. Dep. Work. Pap. 10.1787/5km33svj7pxs-en.

Beetsma, R., Debrun, X., Fang, X., Kim, Y., Lledó, V., Mbaye, S., Zhang, X., 2019. Independent fiscal councils: Recent trends and performance. Eur. J. Polit. Econ. 57, 53–69. 10.1016/j.ejpoleco.2018.07.004.

Beetsma, R., Giuliodori, M., Klaassen, F., 2008. The Effects of Public Spending Shocks on Trade Balances and Budget Deficits in the European Union. J. Eur. Econ. Assoc. 6, 414–423. https://doi.org/10.1162/JEEA.2008.6.2-3.414.

Bergman, U.M., Hutchison, M.M., Jensen, S.E.H., 2016. Promoting sustainable public finances in the European Union: The role of fiscal rules and government efficiency. Eur. J. Polit. Econ. 44, 1–19. https://doi.org/10.1016/j.ejpoleco.2016.04.005.

Betts, C., Devereux, M.B., 2000. The International Effects of Monetary and Fiscal Policy in a Two-Country Model. In: Calvo, G.A., Dornbusch, R., Obstfeld, M. (Eds.), Money, Capital and Trade: Essays in Honor of Robert A. MIT Press, Cambridge, MA, Mundell, pp. 9–52.

Bluedorn, J., Leigh, D., 2011. Revisiting the twin deficits hypothesis: the effect of fiscal consolidation on the current account. IMF Econ. Rev. 59, 582–602. https://doi.org/10.1057/imfer.2011.21.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. J. Econom. 87, 115–143. https://doi.org/10.1016/S0304-4076(98)00009-8.

Boileau, M., Normandin, M., 2012. Do tax cuts generate twin deficits? A multi-country analysis. Can. J. Econ. Can. Déconomique 45, 1667–1699. https://doi.org/10.1111/j.1540-5982.2012.01748.x.

Born, B., Juessen, F., Müller, G.J., 2013. Exchange rate regimes and fiscal multipliers. J. Econ. Dyn. Control 37, 446–465. https://doi.org/10.1016/j.jedc.2012.09.014.

Bova, E., Medas, P., Poghosyan, T., 2018. Macroeconomic stability in resource-rich countries: the role of fiscal policy. J. Bank. Financ. Econ. 2018, 103–122. https://doi.org/10.7172/2353-6845.jbfe.2018.1.5.

Bowsher, C.G., 2002. On testing overidentifying restrictions in dynamic panel data models. Econ. Lett. 77, 211–220. https://doi.org/10.1016/S0165-1765(02)00130-1.

Bruno, G.S.F., 2005. Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. Econ. Lett. 87, 361–366. https://doi.org/10.1016/j.econlet.2005.01.005.

Bussière, M., Fratzscher, M., Müller, G.J., 2010. Productivity shocks, budget deficits and the current account. J. Int. Money Finance 29, 1562–1579. https://doi.org/10.1016/j.jimonfin.2010.05.012.

Caselli, F.G., Reynaud, J., 2019. Do fiscal rules cause better fiscal balances?: a new instrumental variable strategy, IMF Working Paper 19/49. International Monetary Fund, Washington, DC.

Cavallo, M., 2005. Government Consumption Expenditures and the Current Account (No. Working Paper 2005-03). Federal Reserve Bank of San Francisco Working Paper, San Francisco.

Cerrato, M., Kalyoncu, H., Naqvi, N.H., Tsoukis, C., 2015. Current Accounts in the Long Run and the Intertemporal Approach: A Panel Data Investigation. World Econ. 38, 340–359. 10.1111/twec.12152.

Chen, D.Y., 2007. Effects of monetary policy on the twin deficits. Q. Rev. Econ. Finance 47, 279–292. 10.1016/j.qref.2006.05.002.

Chinn, M.D., Ito, H., 2007. Current account balances, financial development and institutions: assaying the world "saving glut". J. Int. Money Finance 26, 546–569. https://doi.org/10.1016/j.jimonfin.2007.03.006.

Chinn, M.D., Prasad, E.S., 2003. Medium-term determinants of current accounts in industrial and developing countries: an empirical exploration. J. Int. Econ. 59, 47–76. https://doi.org/10.1016/S0022-1996(02)00089-2.

Cordes, T., Kinda, T., Muthoora, P.S., Weber, A., 2015. Expenditure Rules: Effective Tools for Sound Fiscal Policy?, IMF Working Paper 15/29. International Monetary Fund.

Corsetti, G., Muller, G.J., 2006. Twin deficits: squaring theory, evidence and common sense. Econ. Pol. 21, 598–638. https://doi.org/10.1111/j.1468-0327.2006.00167.x.

de Haan, J., Jong-A-Pin, R., Mierau, J.O., 2013. Do budgetary institutions mitigate the common pool problem? New empirical evidence for the EU. Public Choice 156, 423–441. https://doi.org/10.1007/s11127-012-9949-5.

Debrun, X., Jonung, L., 2019. Under threat: Rules-based fiscal policy and how to preserve it. Eur. J. Polit. Econ. 57, 142–157. https://doi.org/10.1016/j.ejpoleco.2018.09.001.

Debrun, X., Kinda, T., 2017. Strengthening Post-Crisis Fiscal Credibility: Fiscal Councils on the Rise - A New Dataset: Strengthening post-crisis fiscal credibility: fiscal councils on the rise - a new dataset. Fisc. Stud. 38, 667–700. https://doi.org/10.1111/1475-5890.12130.

Eyraud, L., Debrun, X., Hodge, A., Lledó, V., Pattillo, C., 2018. Second-Generation Fiscal Rules: Balancing Simplicity, Flexibility, and Enforceability (IMF Staff Discussion Note. IMF Staff Discussion Note No. SDN/18/04).

Ferrero, A., 2010. A structural decomposition of the U.S. trade balance: Productivity, demographics and fiscal policy. J. Monet. Econ. 57, 478–490. https://doi.org/10.1016/j.jmoneco.2010.04.004.

Gaysset, I., Lagoarde-Segot, T., Neaime, S., 2019. Twin deficits and fiscal spillovers in the EMU's periphery A Keynesian perspective. Econ. Model. 76, 101–116. https://doi.org/10.1016/j.econmod.2018.07.023.

Gilbert, N.D., de Jong, J.F.M., 2017. Do European fiscal rules induce a bias in fiscal forecasts? Evidence from the Stability and Growth Pact. Public Choice 170, 1–32. https://doi.org/10.1007/s11127-016-0372-1.

Gossé, J.-B., Serranito, F., 2014. Long-run determinants of current accounts in OECD countries: lessons for intra-European imbalances. Econ. Model. 38, 451–462. https://doi.org/10.1016/j.econmod.2014.01.008.

Grier, K., Ye, H., 2009. Twin sons of different mothers: The long and the short of the twin deficits debate. Econ. Inq. 47, 625–638. https://doi.org/10.1111/j.1465-7295.2008.00162.x.

Gruber, J.W., Kamin, S.B., 2007. Explaining the global pattern of current account imbalances. J. Int. Money Finance 26, 500–522. https://doi.org/10.1016/j.jimonfin.2007.03.003.

Guajardo, J., Leigh, D., Pescatori, A., 2011. Expansionary Austerity: New International Evidence (IMF Working Paper No. WP/11/158).

Guerguil, M., Mandon, P., Tapsoba, R., 2017. Flexible fiscal rules and countercyclical fiscal policy. J. Macroecon. 52, 189–220. https://doi.org/10.1016/j.jmacro.2017.04.007.

Hallerberg, M., Wolff, G.B., 2008. Fiscal institutions, fiscal policy and sovereign risk premia in EMU. Public Choice 136, 379–396. https://doi.org/10.1007/s11127-008-9301-2.

Heinemann, F., Moessinger, M.-D., Yeter, M., 2018. Do fiscal rules constrain fiscal policy? A meta-regression-analysis. Eur. J. Polit. Econ. 51, 69–92. https://doi.org/10.1016/j.ejpoleco.2017.03.008.

Holmes, M.J., 2011. Threshold cointegration and the short-run dynamics of twin deficit behaviour. Res. Econ. 65, 271–277. https://doi.org/10.1016/j.rie.2010.11.004.

Holm-Hadulla, F., Hauptmeier, S., Rother, P., 2012. The impact of expenditure rules on budgetary discipline over the cycle. Appl. Econ. 44, 3287–3296. https://doi.org/10.1080/00036846.2011.572855.

Huidrom, R., Kose, A., Lim, J.J., Ohnsorge, F.L., 2019. Why Do Fiscal Multipliers Depend on Fiscal Positions? Policy Research Working Papers. The World Bank. https://doi.org/10.1596/1813-9450-8784.

Hürtgen, P., Rühmkorf, R., 2014. Sovereign default risk and state-dependent twin deficits. J. Int. Money Finance 48, 357–382. https://doi.org/10.1016/j.jimonfin.2014.05.020.

Ilzetzki, E., Mendoza, E.G., Végh, C.A., 2013. How big (small?) are fiscal multipliers? J. Monet. Econ. 60, 239–254. https://doi.org/10.1016/j.jmoneco.2012.10.011.

Ilzetzki, E., Reinhart, C.M., Rogoff, K.S., 2019. Exchange Arrangements Entering the Twenty-First Century: Which Anchor will Hold?*. Q. J. Econ. 134, 599–646. https://doi.org/10.1093/qje/qjy033.

IMF, 2014. World economic outlook: Legacies, clouds, uncertainties. World economic outlook. Internat, Monetary Fund, Washington, DC.

Jordà, Ò., 2005. Estimation and Inference of Impulse Responses by Local Projections. Am. Econ. Rev. 95, 161–182.

Kalou, S., Paleologou, S.-M., 2012. The twin deficits hypothesis: Revisiting an EMU country. J. Policy Model. 34, 230–241. https://doi.org/10.1016/j.jpolmod.2011.06.002.

Kim, S., Roubini, N., 2008. Twin deficit or twin divergence? Fiscal policy, current account, and real exchange rate in the U.S. J. Int. Econ. 74, 362–383. https://doi.org/10.1016/j.jinteco.2007.05.012.

Kiviet, J.F., 1995. On bias, inconsistency, and efficiency of various estimators in dynamic panel data models. J. Econom. 68, 53–78. https://doi.org/10.1016/0304-4076(94)01643-E.

Kopits, G., Symansky, S.A., 1998. Fiscal policy rules. Occasional paper / International Monetary Fund, International Monetary Fund, Washington, DC.

Krogstrup, S., Wälti, S., 2008. Do fiscal rules cause budgetary outcomes? Public Choice 136, 123–138. https://doi.org/10.1007/s11127-008-9285-y.

Laeven, L., Valencia, F., 2018. Systemic Banking Crises Revisited, IMF Working Paper 18/206. International Monetary Fund.

Lagona, F., Padovano, F., 2007. A nonlinear principal component analysis of the relationship between budget rules and fiscal performance in the European Union. Public Choice 130, 401–436. https://doi.org/10.1007/s11127-006-9095-z.

Lane, P.R., Milesi-Ferretti, G.M., 2012. External adjustment and the global crisis. J. Int. Econ. 88, 252–265. https://doi.org/10.1016/j.jinteco.2011.12.013.

Lee, J., Milesi-Ferrett, G.M., Ostry, J., Prati, A., Ricci, L., 2008. Exchange rate assessments: CGER methodologies. Occasional paper, International Monetary Fund, Washington, DC.

Litsios, I., Pilbeam, K., 2017. An empirical analysis of the nexus between investment, fiscal balances and current account balances in Greece, Portugal and Spain. Econ. Model. 63, 143–152. https://doi.org/10.1016/j.econmod.2017.02.003.

Lledó, V., Yoon, S., Fang, X., Mbaye, S., Kim, Y., 2017. Fiscal Rules at a Glance. International Monetary Fund, Washington, DC.

Mbaye, S., Moreno Badia, M., Chae, K., 2018. Global debt database: methodology and sources, IMF Working Paper 18/111. International Monetary Fund, Washington, DC.

Medina, L., Prat, J., Thomas, A., 2010. Current Account Balance Estimates for Emerging Market Economies, IMF Working Paper 10/43. Washington, DC.

Milesi-Ferretti, G.M., 2004. Good, bad or ugly? On the effects of fiscal rules with creative accounting. J. Public Econ. 88, 377–394. https://doi.org/10.1016/S0047-2727(02)00076-2.

Miyamoto, W., Nguyen, T.L., Sheremirov, V., 2019. The effects of government spending on real exchange rates: Evidence from military spending panel data. J. Int. Econ. 116, 144–157. https://doi.org/10.1016/j.jinteco.2018.11.009.

Müller, G.J., 2008. Understanding the dynamic effects of government spending on foreign trade. J. Int. Money Finance 27, 345–371. https://doi.org/10.1016/j.jimonfin.2008.01.005.

Nickel, C., Tudyka, A., 2014. Fiscal Stimulus in Times of High Debt: Reconsidering Multipliers and Twin Deficits. J. Money Credit Bank. 46, 1313–1344. https://doi.org/10.1111/jmcb.12148.

Nickel, C., Vansteenkiste, I., 2008. Fiscal policies, the current account and Ricardian equivalence (No. 935), ECB Working Paper 935. European Central Bank, Frankfurt.

Obstfeld, M., Rogoff, K., 1995. Exchange Rate Dynamics Redux. J. Polit. Econ. 103, 624–660. https://doi.org/10.1086/261997.

Obstfeld, M., Rogoff, K., 1995b. The intertemporal approach to the current account, in: Handbook of International Economics. Elsevier, pp. 1731–1799. 10.1016/S1573-4404(05)80014-0.

Perotti, R., 1999. Fiscal Policy in Good Times and Bad. Q. J. Econ. 114, 1399–1436. https://doi.org/10.1162/003355399556304.

Reuter, W.H., 2019. When and why do countries break their national fiscal rules? Eur. J. Polit. Econ. 57, 125–141. https://doi.org/10.1016/j.ejpoleco.2018.08.010.

Reuter, W.H., 2015. National numerical fiscal rules: Not complied with, but still effective? Eur. J. Polit. Econ. 39, 67–81. https://doi.org/10.1016/j.ejpoleco.2015.04.002.

Roodman, D., 2009. A Note on the Theme of Too Many Instruments. Oxf. Bull. Econ. Stat. 71, 135–158. https://doi.org/10.1111/j.1468-0084.2008.00542.x.

Rose, S., 2006. Do fiscal rules dampen the political business cycle? Public Choice 128, 407–431. https://doi.org/10.1007/s11127-005-9007-7.

Salvatore, D., 2006. Twin deficits in the G-7 countries and global structural imbalances. J. Policy Model. 28, 701–712. https://doi.org/10.1016/j.jpolmod.2006.06.003.

Schaechter, A., Kinda, T., Budina, N., Weber, A., 2012. Fiscal rules in response to the crisis: Toward the next-generation rules: A new dataset, IMF Working Paper 12/187. International Monetary Fund, Washington, D.C.

Shambaugh, J.C., 2004. The Effect of Fixed Exchange Rates on Monetary Policy. Q. J. Econ. 119, 301–352. https://doi.org/10.1162/003355304772839605.

Summers, L.H., 1988. Tax Policy and International Competitiveness. In: International Aspects of Fiscal Policies. University of Chicago Press, Chicago, pp. 349–386.

Sutherland, A., 1997. Fiscal crises and aggregate demand: can high public debt reverse the effects of fiscal policy? J. Public Econ. 65, 147–162. https://doi.org/10.1016/S0047-2727(97)00027-3.

Tapsoba, R., 2012. Do National Numerical Fiscal Rules really shape fiscal behaviours in developing countries? A treatment effect evaluation. Econ. Model. 29, 1356–1369. https://doi.org/10.1016/j.econmod.2012.03.003.

Tóth, C.G., 2019. Valuable legacy? The effect of inherited fiscal rules. Public Choice 178, 3–30. https://doi.org/10.1007/s11127-018-0605-6.

Trachanas, E., 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. Econ. Model. 31, 502–510. https://doi.org/10.1016/j.econmod.2012.12.026.

von Hagen, J., 2010. Sticking to fiscal plans: the role of institutions. Public Choice 144, 487–503. https://doi.org/10.1007/s11127-010-9680-z.

Xie, Z., Chen, S.-W., 2014. Untangling the causal relationship between government budget and current account deficits in OECD countries: Evidence from bootstrap panel Granger causality. Int. Rev. Econ. Finance 31, 95–104. https://doi.org/10.1016/j.iref.2014.01.014.

Yohai, V., 1987. High Breakdown-Point and High Efficiency Robust Estimates for Regression. Ann. Stat. 15, 642–656.