Hoodwink Financial Markets?

The impact of creative accounting, stock-flow-adjustments and fiscal rules on European bond yield spreads

Abstract:

We analyze whether bond yield spreads reflect creative accounting by European governments on their fiscal accounts. We approximate creative accounting by stock-flow-adjustments, i.e. deviations between fiscal deficits and debt changes. In addition, we ask for the impact of fiscal rule indices, which indicate how severely governments are limited in their fiscal spending activities. We use annual panel data for 26 EU countries from 1990 onwards with bond yield spreads as dependent variable and several economic and socio-political control variables. Our results indicate that bond markets detect fiscal tricks, as bond yield spreads are significantly increased by stock-flow-adjustments, while fiscal rules reduce them significantly.

Key Words: Bond Yield Spreads, European Monetary Union, Creative Accounting, Fiscal Rules, Stock-Flow-Adjustments

1. Introduction

The analysis of the drivers of bond yields and bond yield spreads is an important issue. It determines countries' borrowing costs and, thus, public welfare. Hence, the issue is intensively debated in the literature (see our literature review in the next section). The major driver of yield spreads is sovereign default risk. Therefore, scholars search for the major determinants of this risk. Here fiscal variables, such as fiscal deficit and public debt, are found to be important in many papers. Thus, fiscal rules aiming to reduce or restrict public deficits and debt may reduce bond yields and borrowing costs if markets perceive them to be credible and effective.

However, an interesting strand of the literature, which is overviewed in our literature review in the next section, shows that fiscal rules lead to creative accounting. This means that governments apply various fiscal measures that do not improve the fiscal position de facto, but improve the officially reported numbers on deficit or debt. Creative accounting helps governments to comply with fiscal rules and hampers the effectiveness of fiscal rules. In addition, creative accounting can help to reduce bond yields and, thus, borrowing costs. Better looking numbers on fiscal balances could reduce bond yields if the markets do not detect such behavior. If, by contrast, the markets detect creative accounting yields are supposed to be increased by creative accounting measures. In addition, creative accounting may impact the influence of fiscal rules on bond yields and borrowing cost since it impacts (markets' perception of) the effectiveness of fiscal rules.

Based on these considerations we contribute to the literature by analyzing the following questions: Do bond markets detect creative accounting, so that yield spreads significantly reflect it? Do the markets believe in fiscal rules, i.e. do fiscal rules influence bond yield spreads significantly – even if creative accounting exists?

In the next section we overview the literature related to determinants of bond yield spreads and country default risk, in particular the literature on the relation between fiscal rules and yield spreads. Next we explain how creative accounting can be measured and approximated by stock-flow-adjustments in regressions that aim on explaining the relation between creative accounting and yield spreads. In the fourth section we describe our data and the empirical research strategy. Section 5 provides the results and Section 6 concludes.

2. Literature Review

The literature on determinants of sovereign bond yields is very comprehensive. Regarding their research approach these papers differ in several ways. Some consider primary spreads while others focus on secondary market spreads. Some papers consider time series of single countries; others use cross-section data for multiple countries or panel even data. Several papers look at developing countries while others analyze developed countries. Examples for papers considering primary yield spreads of EU countries are Bernoth, von Hagen and Schuknecht (2006), Schuknecht, von Hagen and Wolswijk (2009), Schuknecht, von Hagen and Wolswijk (2010). Regarding our research the most closely related papers rely on panel data of secondary market spreads for European countries, such as Lemmen and Goodhart (1999), Codogno, Favero and Missale (2003), Manganelli and Wolswijk (2007), and Maltritz (2012). Some basic findings can be summarized. First, fiscal variables, such as the fiscal deficit and debt, are found to be important in many papers. Second, also external influences seem to matter. Especially the risk free lending rate, mostly approximated by the US, the Swiss or the German yield, is found to be significant in a several papers. Also variables related to countries' external transactions, in particular the current account balance were found to be important (see Maltritz, 2012).

The first studies on the influence of fiscal rules on borrowing costs focused on the sub-national level, i.e. the U.S. states (Johnson and Kriz, 2005; Lowry and Alt, 2001; Poterba and Rueben, 2001, 1999). Recently Feld et al. (2017) extended this literature to Switzerland by analyzing 288 bonds from 18 cantons in the time span from 1981 to 2007. They find that strong fiscal rules significantly reduce the spread between the cantonal bond yields and the average Swiss federal bond yield.

Our focus in this paper, however, is on the influence fiscal rules have at the *national* level – a topic that has recently received more and more attention. Iara and Wolff (2014) analyze the influence of fiscal rules on yield spreads in 10 Euro member countries (relative to Germany) from 1999 to 2009. They find that strict fiscal rules do indeed lead to lower risk premia. However, the narrow time span and the limited amount of countries covered leaves them with a small number of observations (N = 66 in the baseline model). Heinemann et al. (2014) broaden the scope to a sample of 15 Euro and non-Euro members from 1993 onwards. They find that countries with fiscal rules face lower risk premia than countries without such rules and that fiscal rules work best in reducing sovereign risk premia when they are applied in countries where the electorate has a low preference for fiscal stability and where a low level of mutual trust and social capital prevails. Afonso and Guimarães (2015) analyze the impact of fiscal rules on 10 year sovereign bond yields in the EU-27 from 1990-2011. They also find that the strength of fiscal rules significantly lowers sovereign bond yields.

Recently, the IMF has also published a dataset on fiscal rules in 89 developed and developing countries worldwide for the time span from 1985 to 2014 (Elva et al., 2015; Schaechter et al., 2012). Using this index for a sample of 67 developed and developing countries from1985 to 2012, Thornton and Vasilakis (2017) find that budget balance and debt rules significantly reduce risk premia. Badinger and Reuter (2017) use the IMF dataset to construct a fiscal rule index based on partially ordered set theory. Their analysis covers 74 developed and developing countries worldwide in the time span from 1985 to 2012 and includes balanced budget rules, debt rules and "an index relating to general fiscal institutions […], indicating the existence of multi-year frameworks, of independent bodies setting assumptions as well as laws on monitoring performance, transparency, and accountability" (Badinger and Reuter, 2017, p. 336). They confirm the finding that stronger fiscal rules lead to higher budget balances and lower yield spreads.

3. Creative accounting, stock-flow-adjustments and bond yield spreads

While fiscal rules may help to install sound fiscal policies, they reduce governments' space for fiscal policy, i.e. reduce the potential for fiscal spending or reducing taxes. Thus, fiscal rules provide incentives for governments to apply creative accounting. This was shown in a theoretical model by Milesi-Ferreti (2003). Creative accounting means that fiscal activities are used to improve official numbers on debt or deficit while the net worth of the fiscal situation is not bettered. Of course, creative accounting can also be applied for reasons other than complying with fiscal rules, in particular also to reduce interest rates on public debt (if governments assume that markets can be tricked in this way).

Several papers have shown that creative accounting has been applied in EU countries in order to comply with fiscal rules, especially to stick with the 'Maastricht-criteria' in the run-up to the EMU (see e.g. Dafflon and Rossi, 1999, Milesi-Ferretti, and Moriyama, 2004, Koen and van den Noord, 2005). These papers provide interesting insights and discussions of specific transactions that have been undertaken to stick to rules. For empirical analysis on a macroeconomic base for a broad set of countries the problem arises that no comprehensive and comparable data exists. Von Hagen and Wolff (2006) provide the interesting suggestion to approximate creative accounting by so-called stock-flow adjustments.

Theoretically for public finances should hold that the deficit in one period, $D_{t,i}$, equals the difference between debt in some period t, $B_{t,i}$, compared to the debt in period before, $B_{t-1,i}$, for any country i:

$$B_{t,i} - B_{t-1,i} = D_{t,i} \quad \rightarrow \quad B_{t,i} = B_{t-1,i} + D_{t,i} \qquad (1)$$

However, this equation often does not hold in practice. Instead there is an additional residual so that:

$$B_{t,i} = B_{t-1,i} + D_{t,i} + SFA_{t,i} \quad \rightarrow \quad SFA_{t,i} = (B_{t,i} - B_{t-1,i}) - D_{t,i} \tag{2}$$

where $SFA_{t,i}$ is the stock-flow adjustment at time t in country i. Thus, a positive stock-flow-adjustment means that the reported deficit was smaller than the change in the debt stock would have required.

Stock-flow-adjustments may result from a variety of reasons. For example the accounting of debt is different from the accounting of the budget balance. The latter is recorded on accrual numbers, while debt is measured in cash. So, stock-flow-adjustments result from revenues (or expenditures) that change the fiscal balance but not change the debt since no cash payment is made. Stock-flow-adjustments may occur also from valuation and classification effects, e.g. a revaluation of central banks gold reserves. Also the selling of public capital, e.g. the privatization of public enterprises, may lead to stock-flow-adjustments. Similar, increasing the public capital stock by acquiring private enterprises by the public sector leads to stock-flow-adjustments. A more detailed discussion of fiscal transactions that lead to stock-flow-adjustments can be found in the literature mentioned above.

It is important to notice that not all types of fiscal tricks and creative accounting necessarily lead to stock-flow-adjustments. Several measures applied may change the deficit and the debt situation in the same amount, which means that no stock-flow-adjustments are to observe. Vice versa not all transactions that lead to stock-flow-adjustments result from intended creative accounting. On the contrary, conventionally, stock-flow-adjustments were assumed

to “result primarily from financial operations, for example, debt issuance policy to manage public debt, privatisation receipts, impact of exchange rate changes on foreign denominated debt. In general, these should tend to cancel out over time” (European Commission, 2003, p. 82). However, as Hagen and Wolff (2006) demonstrated, stock-flow-adjustments do not “cancel out over time” but are strategically used for creative accounting by European governments. This means, that they can be used as a proxy for creative accounting.

The existence of a proper proxy of creative accounting, which is available for a variety of countries on an annual base over an extended period of time, makes it possible to study its impact on yield spreads empirically by panel regressions. The first pioneering – and so far only paper – which analyzes the impact of stock-flow-adjustments on primary yield spreads is Bernoth and Wolff (2008). They cover in their inspiring paper the EU-15 (without Luxemburg) from 1991 to 2005 and find that budget deficits and SFA increase yield spreads. This effect is, however, significantly diminished by a membership in the European Monetary Union (EMU). So, Bernoth and Wolff (2008, p. 481) conclude that “[d]eficits and creative accounting are penalized less in EMU.” One could interpret EMU membership as a proxy for fiscal rules, which are related to this membership (‘Maastricht criteria’). However, EMU membership has a several additional features related to it. So, it remains unclear if this influence of EMU membership on stock-flow-adjustments is due to the fiscal rules associated with the Stability and Growth Pact or other features of EMU membership, e.g. with the investors’ expectation of a bail out in case of a looming default.

4. Empirical strategy and data

Summing up the state of the literature related to our topic, we can conclude that there are several interesting papers that analyze the influence of fiscal rules on yield spreads, but do not control for creative accounting, which, however, is supposed to influence the results. Then, we have the inspiring paper by Bernoth and Wolff (2008) who consider the impact of creative accounting, approximated by stock-flow-adjustments, on yield spreads but do not control for fiscal rules. We contribute to this literature by performing an empirical analysis of yield spreads that includes both stock-flow adjustments as a proxy for creative accounting and a comprehensive fiscal rules index that pictures whether fiscal rules are in place and how strong they are.

In order to analyze the influence of these variables on yield spreads, we run regressions using pooled data with annual time series for 26 EU countries for the period 1990 – 2014. We exclude Croatia because of data availability and Germany because we use the German yield to calculate the yield spread. Similar as several other papers, we use secondary bond market data on the yield spread between the 10-year government bond yield of the respective country and the German 10-year bond yield as dependent variable. The data is provided by Datastream®. The analysis covers data until 2014 only since our fiscal rules indices are available in the time of writing (early 2017) only until 2014.

Our primary concern regards fiscal rules as attempts to enforce sound fiscal policies and stock-flow-adjustments as proxy for creative accounting, i.e. attempts to avoid sound fiscal policies. As explained in the last section stock-flow-adjustments result from the difference between the fiscal balance and the change in debt. This data is taken from the European Commission's AMECO database. In order to account for the importance of stock-flow-

adjustments relative to the size of countries and their fiscal budgets we consider stock-flow-adjustments relative to total government expenditures.

Stock-flow-adjustments can either be positive or negative. This has implications for its use as a proxy for creative accounting. Depending on whether the government aims to tune deficit or debt numbers an impact in different directions on stock-flow-adjustments results. When the government uses measures to improve debt numbers (that do not impact deficit numbers) it has a negative impact on stock-flow-adjustment, since a reduction of the current debt in Equation (2) without a change the deficit leads to reduced stock-flow-adjustments. If, by contrast, the government applies measures that reduce the deficit (and do not change the debt) stock-flow-adjustments are increased. This is because the deficit has a negative sign in Equation (2). What does it mean for the use of stock-flow-adjustments as a measure for creative accounting and its relation to yield spreads and default risk? The influence on spreads can either be positive or negative since both types of actions, i.e. those that pretend better debt numbers and those that lead to better deficits numbers, may impact market participant's perception of default risk. This means that positive and negative influences in the regressions can cancel each other out and we, thus, may underestimate the impact of stock-flow-adjustments on spreads. In order to solve this problem, we consider absolute values, i.e. only the amount of stock-flow-adjustments without considering the sign. Stock-flow-adjustments indicate creative accounting no matter whether the result from polishing debt numbers (which lead to a negative sign) or deficit numbers (positive sign).[1]

[1] Note that nevertheless, our indicator may underestimate the true amount of creative accounting since the observed numbers may be reduced because one country applies in a specific year simultaneously measures for debt, on the one hand, and deficit, on the other. In this way our proxy is rather conservative. Non significant impact would not necessarily mean that creative accounting does not impact spreads. If we still find a significant impact, it is rather a robust finding.

The fiscal rule index we use provides a detailed and comprehensive picture of the situation (see also Table A-2 in the appendix). We use data from the databases of the European Commission. The fiscal rules index covers not only the existence of rules, but also their strength and rigor regarding several dimensions. What is more, we can distinguish between rules that refer to the debt, on the one hand and the fiscal balance, on the other, where we further distinguish between revenue rules and expenditure rules. This data refers to all levels of government (local, regional, central, general government and the social security). It includes information on the legal basis and the flexibility of the rule, the enforcement and monitoring institutions and mechanisms as well as the media attention that the rule receives. Each rule is weighted by the share of the general government budget it covers. If there is more than one rule encompassing one subsector of government at the same time, the strongest one is weighted with the factor 1, the second strongest with 1/2, the third strongest with 1/3 etc. Thus, a single score per country per year is constructed (see European Commission, 2006, pp. 163–164, and 2016 for further details).

Another variable which is related to fiscal rules (and used as an indicator for fiscal rules in the literature) is EMU membership, which we capture with the dummy variable EURO. Membership in the Euro area is associated with the external fiscal rules of the Stability and Growth Pact ('Maastricht criteria'), i.e. the 60 percent debt-to-GDP ratio and the 3 percent deficit-to-GDP ratio. In this sense EMU membership can be used as an indicator for fiscal rules (as it is done in the literature). EMU membership has, however, several additional aspects. For example, one can presume that markets expect help or even bail-outs from other European countries in cases of economic problems, i.e. markets expected ex-ante what actually happened during the Euro crisis. Even without focusing on crisis events, EMU membership may improve or maybe also worsen the economic situation of countries and, thus, yield spreads, e,g, because EMU membership improves economic conditions or because

devaluations of the country's domestic currency to currencies of other European countries (that are EMU members) are not possible (which according to the interest parity theory excludes yield differentials). Since EMU membership covers several aspects in addition to the implied fiscal rules, it is not a pure fiscal rules indicator. What is more, the related rules are rather externally imposed while the fiscal rules considered in our fiscal rules index discussed above are rather internal rules, which were imposed by the countries themselves.

In addition to these variables, which we are especially interested in, we include some economic, social and political control variables. The control variable "federal organized state" (FEDERAL) takes the value 0 if a state is organized unitarily and 1 if it is federally organized. The more federal a country is, the more entities (local, regional, central) influence fiscal policy. This larger number of actors (possibly of different political orientation and priorities) could lead investors to expect less coherent fiscal policy so that they demand higher risk premia. But also the opposite impact is possible, e.g. since national and sub-national governments may control each other and, thus, reduce spending. For the variable FEDERAL we use the data from the Comparative Political Data Set (Armingeon et al., 2016).

POPULATION 65 measures the share of the population which is 65 years or older and UNEMPLOYMENT indicates the growth rate in the unemployment rate. The former were taken from EUROSTAT, while the latter were provided by the AMECO database. Both variables are proxies for the pressure on the welfare system and the labor force of a country. A high share of persons over 65 is typically associated with high pension payments, which may increase default risk and, thus, spreads. A reduction of spreads is also thinkable since aging societies typically have higher savings and, thus, capital supply, which is supposed to reduce the price of capital, i.e. interest rates.

A high unemployment rate is associated with high unemployment benefits, which are either directly or indirectly paid and secured by the government. Furthermore, UNEMPL is also an indicator for the general economic situation in a country. The lower the unemployment rate, the more investors should perceive an economy to be competitive. So we expect unemployment to increase yield spreads.

In line with typical findings of the literature, we include the debt-to-GDP ratio (PUBLIC DEBT) and the budget balance in relation to GDP (BUDGET BALANCE). These variables are directly related to the stock and change of payment obligations and, thus, to the probability that the government is not able to serve its obligations in the future. The real GDP growth (GDP GROWTH) indicates the development of the economy and, thus, the potential to acquire funds for repayment of debt obligations. The lower the economic growth, the higher the debt level and the smaller the budget balance, the higher is the probability of a sovereign default. Therefore, high values of debt and low values on fiscal balance and GDP should be associated with higher risk premia, i.e. higher yield spreads. We also include the TRADE BALANCE in our analysis. This reflects findings of the literature (Maltritz, 2012) and the current political discussion in the EMU on the impact of external imbalances on economic and debt crisis in several countries. Data for GDP, debt fiscal balance and trade balance were taken from the AMECO database.

In addition to the mentioned country specific variables we include a general measure that applies to all countries – the risk-free interest rate, which has been found to have a significant impact in several papers in the literature. It accounts for the general financing conditions, which can be supposed to have an impact on default risk and, thus, yield spreads. Thus, we control for this issue and include the German 10-year government bond yield as a proxy for the risk-free rate (YIELD GERMANY).

Considering the features of our data we can see that several variables do not vary much over time or are even constant. This is an issue especially also for the fiscal rules index, a variable in which we are primarily interested, or the Euro dummy (which is also related to fiscal rules). Also some of the control variables do not change much or are, like the federalism dummy, even constant. Thus, it not possible, to include country fixed effects. It is also not possible to include time fixed effects since we have variables that do not differ between countries, such as the risk-free interest rate. Thus, we run regressions with pooled data. Our regressions suffer from hetereroscedasticity and autorcorrelation in the residuals. Thus, we use HAC robust standard errors calculated by the Newey-West approach.

5. Results

5.1 Stock-flow-adjustments, fiscal rules and EMU membership

Using the regression approach and the data described in the last section we infer the results presented in Table 1. Stock-flow-adjustments, our indicator for creative accounting, are highly significant with a positive sign. This means that market data reflect stock-flow-adjustments, i.e. the market participants take creative accounting into account by requiring higher interest rates from countries which apply creative accounting. This result is very robust in several specifications discussed below.

Table 1: Basic Estimation with Stock-flow-adjustments and Fiscal Rules

Dependent Variable: Yield spreads to Germany
Observations 436

Variable	Coefficient	Std. Error	t-Statistic	p-Value
C	1.542972	0.703891	2.192062	0.0289
YIELD GERMANY	-0.186295	0.092856	-2.006270	0.0455
BUDGET BALANCE	-0.064169	0.036831	-1.742234	0.0822
PUBLIC DEBT	0.015812	0.007897	2.002246	0.0459
GDP GROWTH	-0.088490	0.042099	-2.101945	0.0361
TRADE BALANCE	-3.899933	1.502973	-2.594813	0.0098
UNEMPLOYMENT	0.020863	0.007088	2.943471	0.0034
FEDERAL	-0.672096	0.309892	-2.168804	0.0307
POPULATION 65	-9.69E-05	3.71E-05	-2.612389	0.0093
EMU MEMBER	-0.926217	0.278470	-3.326096	0.0010
SFA	0.088426	0.034966	2.528878	0.0118
FRI	-0.024715	0.141948	-0.174109	0.8619
R-squared	0.454158	F-statistic		32.07106
Adjusted R-squared	0.439997	Prob(F-statistic)		0.000000

Also EMU membership is highly significant with a negative sign. This means EU membership reduces yield spreads and, thus, perceived default risk. This could be for several reasons, e,g, since EMU membership is expected to lead to bail-outs in case of payment problems, because EMU membership fosters economic development or because it prevents

future devaluations (which according to the interest parity theory leads to yield differentials). The significance of EMU membership can also be interpreted, however, as evidence for the impact of fiscal rules since it is at least partly related to fiscal rules ('Maastricht criteria').

Our fiscal rules index by contrast is not significant. This would indicate that markets do not believe in the effects of such rules regarding a reduction of spreads. However, this outcome may result since other variables capture the impact of fiscal rules or to put differently since fiscal rules impact other variables that in turn influence fiscal rules. Fiscal rules aim at reducing deficits and debts and, thus, have been shown to be correlated with debt and deficit, especially within the EU member states (see e.g. Ayuso-i-Casals et al. 2009; Broesens and Wierts 2009; Debrun et al. 2008; von Hagen 2006; Hallerberg, Strauch, and von Hagen 2009a, 2009b; Maltritz and Wüste 2015). Table 1 shows that debt and the fiscal balance (i.e. the deficit with the opposite sign) do impact yield spreads. The sign points in the expected direction: Higher debts (positive sign) lead to higher spread and higher fiscal balance (negative sign), i.e. a lower deficit, leads to lower spreads. Since the public debt and the fiscal balance impact spreads, the fiscal rules may influence spreads as well, albeit indirectly by reducing debt and deficit. Thus, we provide results for an alternative estimation that excludes debt and fiscal balance. In this case fiscal rules turn out to be significant. Taking these results together we can conclude that bond market participants consider fiscal rules effective in reducing default risk by reducing debt and deficit, but do not expect an additional impact.

Table 2: Estimation without Debt and Budget Balance

Dependent Variable: Yield spreads to Germany
Observations: 436

Variable	Coefficient	Std. Error	t-Statistic	p-Value
C	2.968978	0.501779	5.916899	0.0000
YIELD GERMANY	-0.310631	0.090858	-3.418884	0.0007
GDP GROWTH	-0.155099	0.052540	-2.952018	0.0033
TRADE BALANCE	-4.599795	1.586644	-2.899073	0.0039
UNEMPLOYMENT	0.016465	0.006557	2.511234	0.0124
FEDERAL	-0.365105	0.236800	-1.541829	0.1239
POPULATION 65	-3.68E-05	3.24E-05	-1.135785	0.2567
EMU MEMBER	-0.751021	0.306602	-2.449495	0.0147
SFA	0.100026	0.038605	2.591026	0.0099
FRI	-0.284033	0.125295	-2.266918	0.0239
R-squared	0.404600	F-statistic		32.16507
Adjusted R-squared	0.392021	Prob(F-statistic)		0.000000

5.2 The impact of different types of fiscal rules

As mentioned in the last section our data enables us to distinguish between different types of rules, in particular between rules related to the debt (debt rules) and rules related to the deficit. Regarding the latter we can further differentiate between rules related to expenditures (expenditure rules) and rules related to revenues (revenue rules).Thus, we are able to analyze which specific types of rules are considered to be effective by the market participants. Table 3 provides the results. Our results indicate that especially expenditure rules are considered to be effective, while debt rules and revenue rules are not significant. In order to control for multi-co-linearity issues we provide results for estimations where these specific fiscal rules indicators are included separately in the appendix. It can be seen that revenue rules are significant as well, i.e. also these rules may impact yield spreads. Debt rules, however, show no significance. This means market participants do not believe in the effectiveness of debt rules while budget rules are considered to be effective in reducing default risk by reducing deficits.

Table 3: Estimation with Specific Fiscal Rules Indices

Dependent Variable: Yield spreads to Germany
Observations: 436

Variable	Coefficient	Std. Error	t-Statistic	p-Value
C	2.952951	0.512143	5.765872	0.0000
YIELD GERMANY	-0.239704	0.091714	-2.613611	0.0093
GDP GROWTH	-0.172647	0.049254	-3.505219	0.0005
TRADE BALANCE	-3.942345	1.428560	-2.759663	0.0060
UNEMPLOYMENT	0.015186	0.006556	2.316362	0.0210
FEDERAL	-0.643951	0.247211	-2.604867	0.0095
POPULATION 65	-6.07E-05	3.38E-05	-1.794593	0.0734
EMU MEMBER	-0.515602	0.297420	-1.733582	0.0837
SFA	0.090868	0.039304	2.311918	0.0213
FRI-DEBT	0.042167	0.042599	0.989850	0.3228
FRI-EXPENDITURES	-0.210468	0.056711	-3.711226	0.0002
FRI-REVENUES	-0.042861	0.041649	-1.029108	0.3040
R-squared	0.431607	F-statistic		29.26935
Adjusted R-squared	0.416861	Prob(F-statistic)		0.000000

5.3 Control Variables

We would like to add a short discussion of the control variables. Regarding these variables our results more or less confirm the results of the literature since they show the expected significance and the expected sign. As already mentioned public debt and the fiscal balance are significant with the expected (positive respectively negative) sign. The same holds true for the other economic variables. Higher GDP growth reduces yield spreads significantly. The same holds true for lower unemployment rates. A positive trade balance is significantly related to lower yield spreads. This result is in line with findings of the literature. It may in particular result since it lowers default risk. Also the risk-free interest rate (approximated by the 10-year German bond yield) has a significant impact. The negative sign indicates that higher German yields are associated with lower yield spreads.

Also the socio-political control variables are significant. It is interesting to see that federal organized countries have lower spreads. Similar a higher share of people older than 65 years is related to lower interest rates. One explanation could be that in countries with an older

population the saving rate and thus the capital supply is higher, which leads to lower interest rates.

6. Conclusion

Sovereign bond yields are closely related to countries' financing costs. Determinants of bond yields are, thus, an important issue of economic analysis and intensively debated in the literature. Public deficits and debt are found to be important in several papers. The literature shows that these numbers were influenced by creative accounting applied by government to improve public balances (while the fiscal position is not improved). The literature shows that creative accounting is triggered by fiscal rules, which result from EMU membership on the one hand and by countries' own initiative, on the other. Given these findings we ask whether bond markets are aware of creative accounting and take it into account by punishing it with higher bond yields, i.e. lower market prices. Similarly one may ask whether fiscal rules are taken into consideration and improve bond market values, i.e. lower yield spreads.

We analyze in detail whether creative accounting and fiscal rules impact sovereign yield spreads for government bonds or EU countries. We approximate creative accounting by stock-flow-adjustments, which are calculated as the difference between deficits and changes in debt. We use a comprehensive and detailed fiscal rule index that covers several dimensions of fiscal rules in approximating the rigor of rules. What is more, we distinguish between rules aiming on public debt and rules aiming on the fiscal balance, where we further distinguish between rules for revenues and rules for spending. Thus, we complement the existing literature by considering both aspects jointly in empirical analysis and by using very detailed and comprehensive proxies for fiscal rules. We use pooled annual data for 26 EU countries from 1990 onwards. Our dependent variable is the 10-year bond yield spread to the respective German rate.

We find that the amount of stock-flow-adjustments, our indicator for creative accounting, is highly significant as explaining variable for yield spreads with a positive sign. This means (higher) stock-flow-adjustments lead to higher spreads, i.e. lower bond prices. This result is robust in various specifications. This indicates that bond market prices reflect creative accounting.

Fiscal rules for public debt and budget deficits are not significant if they are included together with debt and deficit. This may result since the positive impact rules is already captured by improved debt and deficit numbers. If we exclude debt and deficit our fiscal rules index is significantly related to spreads with a negative sign. These findings indicates that financial markets consider fiscal rules to be effective in promoting sound fiscal policies, which leads to reduced default risk. This impact is, however, reflected by current numbers of deficit and debt and an additional effect, e.g. by expected better future developments, cannot be found. Regarding the specific impact of different types of rules we find that budget (especially expenditure) rules matter, while debt rules show no significance.

With respect to our control variables we confirm the results of the literature. For EMU membership, which is by the 'Maastricht criteria' also related to rules but also captures additional aspects, we find a significant impact on yield spreads with a negative sign. The fiscal balance and public debt are significant as well as GDP growth and unemployment with the expected sign; while higher deficits, debts and unemployment rates increase yield spreads higher growth decreases spreads. A federal state structure reduces spreads and a higher share of people above 65 reduce spreads significantly. Also the German interest rate has a significant negative impact.

Our basic findings can be summarized as follows. Financial market participants take creative accounting into consideration by requiring higher yield spreads. Thus, creative accounting is rather not effective in reducing interest rates because markets require an add-on interest. Fiscal rules are considered to be effective by financial markets, in particular by imposing sound fiscal policies, i.e. reducing debt and deficit, but no additional effect on yield spreads can be detected.

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Appendix

Table A-1: Description of Explaining Variables

Variable	Definition	Source
SFA: Stock-flow adjustments	Stock-flow adjustments are calculated as the sum of the general government budget balance and the difference of general government consolidated gross debt from year t and t-1 in percent of total general government expenditures. (see Equation 2)	AMECO; own calculations
GDP: Real GDP growth	Change of real GDP in percent	IMF Economic Outlook Database
Unemployment: Change in unemployment rate	$\frac{u_{i,t} - u_{i,t-1}}{u_{i,t-1}} \times 100$ where $u_{i,t}$ is the unemployment rate in country i at time t	AMECO; own calculations
Federal	Federalism; coded: 0 = no; 1 = yes.	Armingeon et al. (2016); own calculations
EMU Member	Dummy variable which takes the value 1 if a country was a member of the Eurozone in a given year and 0 if otherwise	European Central Bank[2]
Fiscal Rule Indices: FRI FRI-Debt, FRI-Expenditure , FRI-Revenue	See Table A-2	EU Fiscal Rules Database[3]; own calculations
Public Debt	General government consolidated gross as a percentage of GDP	AMECO
Budget Balance	Net lending (+) or net borrowing (-) as a percentage of GDP	AMECO
Population 65	Share of Population which is 65 years or older in %	Eurostat (tps00028; PC_Y65_MAX)
Trade balance	Difference between exports and imports of goods and services over GDP	AMECO
Yield Germany	German 10-year government bond yield	Datastream®

[2] http://www.ecb.int/euro/intro/html/map.en.html
[3] http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm

Table A-2: Construction of the Fiscal Rule Indices

The fiscal rule indices FRI, FRI-Debt, FRI-Expenditure, FRI-Revenue are constructed using the following steps (where the section of public finances which to rules applies to is taken into consideration for specific fiscal rule indices): First we consider whether fiscal rules are in place in a specific country in the considered year. Second, we distinguish whether a rule aims on the fiscal budget balance or the debt. Third the strength of the rules is evaluated using the following scheme.

Criterion 1: Statutory base of the rule

4 Constitutional base

3 The rule is based on a legal act (e.g. Public Finance Act, Fiscal Responsibility Law)

2 The rule is based on a coalition agreement or an amendment reached by different general government tiers (and not enshrined in a legal act)

1 Political commitment by a given authority

Criterion 2: Room for setting and revising objectives

3 There is no margin for adjusting objectives (they are encapsulated in the document underpinning the rule)

2 There is some but constrained margin in setting or adjusting objectives

1 There is complete freedom in setting or adjusting objectives (the statutory base of the rule merely contains broad principles or the obligation for the government or the relevant authority to set targets)

Criterion 3: Nature of body in charge of monitoring respect and enforcement of the rule

The score of this criterion index is constructed as a simple average of the two elements below:

Nature of the body in charge of monitoring respect of the rule

3 Monitoring by an independent authority (Fiscal Council, Court of Auditors or any other Court) or the national parliament

2 Monitoring by the ministry of finance or any other government body

1 No regular public monitoring of the rule (there is no report systematically assessing compliance)

The score of this sub-criterion is augmented by 1 if there is real time monitoring of compliance with the rule, i.e. if alert mechanisms of risk of non-respect exist.

Nature of the body in charge of enforcement of the rule

3 Enforcement by an independent authority (Fiscal Council or any Court) or the national parliament

2 Enforcement by the ministry of finance or any other government body

1 No specific body in charge of enforcement

Criterion 4: Enforcement of mechanisms of the rule

4 There are automatic correction and sanction mechanisms in case of non-compliance

3 There is an automatic correction mechanism in case of non-compliance and the possibility of imposing sanctions

2 the authority responsible is obliged to take corrective measures in case of non-compliance or is obliged to present corrective proposals to Parliament or the relevant authority

1 There is no ex-ante defined actions in case of non-compliance

The score of this variable is augmented by 1 if escape clauses are foreseen and clearly specified.

Criterion 5: Media visibility of the rule

3 Observance of the rule is closely monitored by the media; non-compliance is likely to trigger public debate

2 High media interest in rule compliance, but non-compliance is unlikely to invoke public debate

1 No or modest interest of the media

Tables A-3: Estimation with Specific Fiscal Rules Indices separately included – Debt Rules

Dependent Variable: Yield spreads to Germany
Observations: 436

Variable	Coefficient	Std. Error	t-Statistic	p-Value
C	2.335603	0.506034	4.615507	0.0000
YIELD GERMANY	-0.176824	0.090682	-1.949942	0.0518
GDP GROWTH	-0.165882	0.052333	-3.169759	0.0016
TRADE BALANCE	-5.515221	1.550487	-3.557089	0.0004
UNEMPLOYMENT	0.016877	0.006297	2.679934	0.0076
FEDERAL	-0.468881	0.212353	-2.208021	0.0278
POPULATION 65	-6.77E-05	3.28E-05	-2.066032	0.0394
EMU MEMBER	-0.544080	0.308134	-1.765723	0.0782
SFA	0.099148	0.039466	2.512213	0.0124
FRI-DEBT	0.051209	0.044262	1.156938	0.2479
R-squared	0.394823	F-statistic		30.88075
Adjusted R-squared	0.382038	Prob(F-statistic)		0.000000

Table A-4: Estimation with Specific Fiscal Rules Indices separately included – Expenditure Rules

Dependent Variable: Yield spreads to Germany
Observations: 436

Variable	Coefficient	Std. Error	t-Statistic	p-Value
C	3.161711	0.461621	6.849150	0.0000
YIELD GERMANY	-0.281329	0.078266	-3.594519	0.0004
GDP GROWTH	-0.164424	0.051063	-3.220011	0.0014
TRADE BALANCE	-3.835205	1.412971	-2.714284	0.0069
UNEMPLOYMENT	0.015416	0.006548	2.354273	0.0190
FEDERAL	-0.587190	0.260159	-2.257040	0.0245
POPULATION 65	-4.98E-05	3.44E-05	-1.450380	0.1477
EMU MEMBER	-0.618756	0.297858	-2.077351	0.0384
SFA	0.093265	0.038055	2.450798	0.0147
FRI-EXPENDITURES	-0.236390	0.055832	-4.233945	0.0000
R-squared	0.426922	F-statistic		35.26159
Adjusted R-squared	0.414815	Prob(F-statistic)		0.000000

Table A-5: Estimation with Specific Fiscal Rules Indices separately included – Revenue Rules

Dependent Variable: Yield spreads to Germany
Observations: 436

Variable	Coefficient	Std. Error	t-Statistic	p-Value
C	2.706104	0.462534	5.850608	0.0000
YIELD GERMANY	-0.218226	0.076986	-2.834634	0.0048
GDP GROWTH	-0.166561	0.052755	-3.157286	0.0017
TRADE BALANCE	-5.217778	1.516367	-3.440974	0.0006
UNEMPLOYMENT	0.016296	0.006579	2.477010	0.0136
FEDERAL	-0.604296	0.239087	-2.527518	0.0118
POPULATION 65	-5.69E-05	3.17E-05	-1.794963	0.0734
EMU MEMBER	-0.572533	0.310418	-1.844396	0.0658
SFA	0.096297	0.038311	2.513594	0.0123
FRI-REVENUES	-0.120739	0.036658	-3.293626	0.0011
R-squared	0.407026	F-statistic		32.49030
Adjusted R-squared	0.394498	Prob(F-statistic)		0.000000