

FOOL THE MARKETS? CREATIVE ACCOUNTING, FISCAL TRANSPARENCY AND SOVEREIGN RISK PREMIA

Kerstin Bernoth and Guntram B. Wolff***

ABSTRACT

We investigate the effects of official fiscal data and creative accounting signals on interest rate spreads between bond yields in the European Union. We find that two different measures of creative accounting indeed both increase the spread. The increase of the risk premium is stronger, if financial markets are unsure about the true extent of creative accounting. Moreover, fiscal transparency reduces risk premia. Instrumental variable regressions confirm these results by addressing potential reverse causality problems and measurement bias.

I INTRODUCTION

The effect of fiscal variables on bond markets is hotly debated. A topic of particular importance concerns the question, whether and to what extent bond markets price in the possibility of (partial) sovereign default by demanding higher interest rates. If a worsening in the fiscal position of an issuer country increases the default probability, it should also be reflected in an increase of the default risk premium contained in bond yields, measurable by an increase in the interest rate spread towards a low risk benchmark country.

In the previous literature, fiscal determinants of sovereign default risk are quantified by the official fiscal position of a country, usually the official debt and deficit figures. The general empirical finding is that bond yields depend positively on the debt and deficit level (Capeci 1991, 1994; Alesina *et al.*, 1992; Bayoumi *et al.*, 1995; Copeland and Jones, 2001; Codogno *et al.*, 2003; Bernoth *et al.*, 2004; Hallerberg and Wolff, 2008; Heppke-Falk and Wolff, 2008). No empirical study so far investigates, whether financial markets are ‘fooled’ by governments if these misreport on their true state of fiscal policy.¹ This is the main purpose of our paper.

Official reported fiscal variables might not give an accurate picture of the true fiscal position of a country for many reasons. Politicians might want to hide

*De Nederlandsche Bank (DNB), Westeinde 1, NL-1000AB Amsterdam

**Deutsche Bundesbank, Wilhelm-Epstein-Str. 14, D-60431 Frankfurt

¹As argued by Koen and van den Noord (2005), governments may wish to put the best possible gloss on the accounts presented to the outside world.

deficits if voters dislike them.² Governments might also want to engage in additional spending without having parliamentary approval. Parliamentary control can be reduced by fiscal misreporting.³ Moreover, fiscal rules such as constitutional deficit limits and international rules such as the stability and growth pact (SGP) constitute limits on official fiscal data and therefore on fiscal behavior. This might increase the incentive of governments to hide away deficits by reverting to window-dressing or shifting fiscal expenditures off the budget (Milesi-Ferretti, 2003). We label these activities 'creative accounting'. Especially the use of creative accounting to 'comply' with the European fiscal rules, namely the excessive deficit procedure (EDP) and the SGP, has recently become an important policy concern in Europe (see e.g. European Commission, 2003).

Numerous studies investigate the effect of fiscal rules on budget outcomes for US states and cities (Bunch, 1991; von Hagen, 1991; Kiewiet and Szakaly, 1996; Bohn and Inman, 1996). The general conclusion from this literature is that binding restraints induce fiscal actors to use other instruments such as creative accounting to dampen the effect of the rule. Relatively few studies investigate the use of 'creative' accounting in the EU.⁴ Von Hagen and Wolff (2006) are the first to analyze accounting tricks in order to comply with the rules of the SGP. They focus on stock-flow adjustments (SFA), which are defined as the difference between the reported annual change in debt levels and the reported deficits. Positive SFA imply that the debt level increases faster than the deficit data suggest. In particular, they find evidence that SFA was systematically used to reduce the official deficit figures. Koen and van den Noord (2005) collect information on single one-off measures (fiscal gimmickry) and show that the probability to observe such measures increases with the budget deficit. The empirical evidence thus confirms the view that fiscal policy figures are sometimes purposely changed to officially comply with fiscal rules. Significant use of one-off measures can be detected in Europe.

The reaction of financial markets to this creative accounting is an important policy topic. If financial markets do not price in the *de facto* deterioration of the fiscal position due to creative accounting, while punishing official deficit data, risk premia could be lowered by shifting deficits to creative accounting. The lower interest rate in turn would provide an incentive to governments to beautify their fiscal data. To our knowledge, no study so far analyzes whether financial markets take note of fiscal window-dressing when pricing government bonds. This is the purpose of our study. In particular, we study whether spreads react, besides official fiscal data, to stock-flow adjustments or to an alternative measure of creative accounting by Koen and van den Noord (2005).

² Alt and Lassen (2006) provide evidence that electoral cycles depend on fiscal transparency. They are less pronounced, the more fiscally transparent a country is. Von Hagen and Wolff (2006) show that creative accounting moves with the business cycle.

³ This is the idea behind the sub-index on fiscal transparency developed in von Hagen (1992).

⁴ Dafflon and Rossi (1999) survey the accounting tricks used in the run-up to the Euro. They find that numerous countries have used tricks to qualify for EMU membership. Similarly, Milesi-Ferretti and Moriyama (2004) find that during the period leading up to 1997 governments reduced the public debt ratio by decumulating government assets in order to qualify for EU membership.

Another line of research suggests that markets consider the quality of a given country's institutions when they assess default probabilities. If this is the case, then also the design of fiscal institutions should have a significant impact on interest rates. In this context, Poterba and Rueben (1999, 2001) analyze the role of state fiscal institutions on interest rates in the United States municipal bond market. They show that institutions affect interest rates beyond their indirect effect on the actual fiscal state measured by e.g., the debt level. Lowry and Alt (2001) specify a similar regression equation and show that fiscal institutions in American states have real effects on bond rates. Johnson and Kriz (2005) show that expenditure limits and stricter balanced budget rules lower interest costs because they lower the credit risk. Hallerberg and Wolff (2008) focus on European bond markets and show that better budget institutions are connected with lower risk premia.

We contribute to this line of research by investigating, in how far fiscal transparency affects risk spreads. Kopits and Craig (1998) argue that international financial markets are likely to demand lower premia from governments that are forthcoming about their fiscal position and risk. The argument is that markets can be more certain about a fiscally transparent government's ability and willingness to service its obligation. A more transparent budget process in addition helps financial markets to detect creative accounting more easily and to assess the true fiscal position of a country. This might increase the spread since more creative accounting becomes known to the markets. Glennerster and Shin (2006) find that the release of macroeconomic information in the form of publication of the IMF article IV consultation reduces spreads. Their measure does not cover fiscal transparency, however. Gelos and Wei (2005) lend further support to the hypothesis of a risk-reducing role of fiscal transparency by showing that international funds prefer to hold more assets in more transparent countries.

These questions are addressed in the framework of Bernoth *et al.* (2004). In this paper, the authors derive a simple portfolio model, which shows that the yield spread between a risky and a risk-free country is explained by a default risk premium, a liquidity risk premium, and an uncertainty premium. In their empirical part, they make use of an innovative data set, which consists of spreads between Deutsche Mark (DM) (Euro after 1999) and US\$ denominated bond issues of 14 EU governments and Germany or the US government, respectively. They show that the interest differentials between sovereign bonds increase with the official figures of the debt and deficit to GDP ratios. In this paper, we modify the basic portfolio model by differentiating between the true fiscal position and the official fiscal position. The default probability assessed by financial markets might differ from the true default probability to the extent that creative accounting exists and is unknown. Transparency by itself reduces uncertainty about the degree of cheating and therefore reduces risk premia.

The next section outlines the model and derives the principle hypotheses. We then present the empirical approach and discuss the data. Section III develops the measures of creative accounting and transparency. Section IV presents and discusses the econometric results while the last section concludes.

II EMPIRICAL APPROACH

We test for the effects of creative accounting and fiscal transparency on risk premia in government bond markets. Our estimation equation can be motivated by the following simple framework. Suppose a risk-free investor has the choice between a risk-free investment, on which she earns a risk-free interest rate r^* and an investment in a risky bond of country i with an expected default probability θ . Under risk-neutrality and the no-arbitrage assumption, the expected return on both investments has to be equal, thus:

$$1 + r^* = (1 - \theta)(1 + r_i), \quad (1)$$

which can be rewritten as:

$$\frac{r_i - r^*}{(1 + r_i)} \approx r - r^* = \theta, \quad (2)$$

where the approximation holds, if interest rates are small.⁵ The interest spread between a country and a risk-free country is thus a function of the expected probability of default.

One important determinant of the expected default probability θ of a country is its fiscal position F (Capeci, 1991, 1994; Alesina *et al.*, 1992). We assume that the true fiscal position of a country is not publicly known. To avoid losses, the investor has to form beliefs on the true fiscal position. The investor's beliefs are based on two sources of information: The first is the officially published state of public finance, i.e. debt and deficit figures. The second is the information on the country's creditworthiness derived from news agencies, i.e. creative accounting information. Applying a Bayesian updating framework, one can show that the posterior belief on the state of public finance is a weighted sum of the officially published figures and the creative accounting information derived from other sources like i.e. news agencies. More precisely, the expected fiscal position of a country, $E(F)$, is described as follows:⁶

$$E(F) = \tilde{F}^{\text{official}} + \gamma(F^{\text{other}} - \tilde{F}^{\text{official}}) \quad (3)$$

We see that the belief about a country's fiscal position consists of two terms. The first is the officially announced fiscal state corrected by the average use of creative accounting. The second term measures the additional creative accounting activity revealed by other information sources that is not included in the corrected official announcement. This additional information is weighted by the precision of the announcement of news agencies relative to the precision of official announcements, γ . Thus, the more reliable the information provided by news agencies is, the more adapt financial markets their expectations to the information announced by this alternative information source.

⁵ Especially, when concentrating on low-interest rate countries like the EU, this is a reasonable assumption conventionally applied in the related literature.

⁶ A derivation of equation (3) is given in the Appendix.

Accordingly, we perform a regression analysis, in which the spread depends on a number of fiscal variables (F), creative accounting signals (CA) and fiscal transparency measures (T), which all influence the probability of default.

$$r_{it} - r_{jt}^* = \alpha_1 + \alpha_2 F_{it} + \alpha_3 CA_{it} + \alpha_4 T_{it} CA_{it} + \alpha_5 T_{it} + \alpha_6 z_{it} + \mu_i + \varepsilon_{it}, \quad (4)$$

where μ_i denotes country dummies and ε_{it} is an error term with usual properties. The dependent variable is the yield spread between a bond issued in EU country i and a benchmark country j , both denominated in the same currency. Looking at spreads between bonds issued in the same currency has the advantage that one can neglect the issue of exchange rate risk so that data coming from the pre-EMU and post-EMU regimes can be analyzed in one data set.⁷ We regard Germany and the USA as benchmark countries and the joint currency of issuance is the DM (Euro after 1999) or the US\$, respectively. The data set includes domestic as well as international issues.

The government bond data are taken from Capital Data Bondware, now part of Dealogic Group, which provides a data set with information on the yield, maturity, and underlying currency of government bond issues.⁸ For every bond issue, Capital Data Bondware searches for an appropriate benchmark bond yield. The yield spread is measured in basis points and is based on the difference in the yield to maturity at the time of issue between the national bond under consideration and a benchmark bond.⁹ The data set of bond yield spreads does not consist of all government bonds issued in the observed time period as an appropriate benchmark bond is not always available. We compare government bonds issued by the 15 EU countries, excluding Luxembourg, between 1991 and beginning 2005 that are denominated in DM before 1998 and subsequently in Euro or alternatively in US\$. Accordingly, the interest differential is measured as the difference in the yield to maturity at the time of issue between the national bond under consideration and an equivalent German government bond in the case of DM/Euro denominated bonds or an equivalent US government bond in the case of a US\$ bond. The data set consists of 99 DM/Euro and 135 US\$ denominated bond issues.

F includes official fiscal variables influencing the fiscal position of a country and thereby the default probability. We use the lagged debt to GDP and deficit to GDP ratios.¹⁰ CA is a creative accounting measure aimed at capturing the news signal, which should affect the expected default probability as it deteriorates the belief on the state of public finance. The fiscal variables and the creative

⁷ Favero *et al.* (1997) discuss the relative performance of this measure with using swap spreads to correct for exchange rate depreciations. They conclude, that both 'proxies obviously tend to measure the same phenomenon'.

⁸ Thanks to Evi Koch for help with Capital Data Bondware.

⁹ Capital Data Bondware defines a benchmark bond in the following way. First, it is issued in the same currency, second, it is issued by the government of the country, which owns the issuing currency, third, it has the same coupon payment structure, and, finally, the issuing date is close that of the comparable bond issue it has a comparable time to maturity.

¹⁰ While the debt level is a stock variable controlling for the fiscal position of a country, the deficit measures the deterioration of that position.

accounting term are measured as the difference relative to the benchmark country Germany and the USA, respectively.¹¹ We expect both, F and CA to positively affect the spread ($\alpha_2, \alpha_3 > 0$). T is a measure of fiscal transparency, which should lower the spread by reducing uncertainty ($\alpha_5 < 0$). The effect of CA on the spread might increase or decrease with an increase in transparency, the direction depends on how transparency affects the informativeness of the news signal relative to the informativeness of the public signal (compare equation (3)). Increased transparency improves the quality of the news signal, but at the same time reduces the uncertainty about the official signal as more transparent countries probably cheat less. Therefore, we expect α_4 to be smaller (larger) zero, if financial markets worry less (more) about the creative accounting news.

z_{it} is a vector containing several variables affecting the yield spread of the issuing country, i.e. a liquidity variable (*liquidity*), an indicator of the cyclical stance (*cycle*) of the economy, a maturity variable (*maturity*), and a variable measuring the general investors' risk attitude (*corspread*). A detailed description of the variables as well as summary statistics are given in Table A1.

The *liquidity* variable serves to estimate the liquidity premium. We cannot follow one of the conventional approaches to use bid-ask spreads, which reflect trading costs in trading securities (Flemming, 2003) as a measure for liquidity, because this information is not reported for primary issues. Gravelle (1999) shows that the correlation between bid-ask spreads and the total supply of debt is significantly negative. This suggests that the total volume of supply of a security has a positive effect on its liquidity, an argument put forward also by Gómez-Puig (2006). Following this reasoning, we assume as Bernoth *et al.* (2004) that liquidity depends on market size and, additionally, that all debt issued by a government in a given currency is homogeneous up to maturity. Thus, the liquidity premium is assumed to be proportional to the ratio of the debt issued by a government in DM/Euro or US\$ to the total debt of EU countries issued in DM/Euro or US\$.¹²

The conventional wisdom is that EMU changed the rules of the game on bond prices. To address potential structural breaks resulting from the introduction of a common currency, we include a dummy for EMU, and we also interact the dummy with the fiscal variables.

All explanatory variables beside *corspread* are only available at an annual frequency, while our data set of bond yield spreads consists of bonds issued at different dates across year t . We have allocated all yield spreads of bonds issued during year t to the explanatory variable measured at the end of year t . As a robustness check, we have alternatively also allocated all bonds issued in the first half of year t to the explanatory variables of year $t - 1$, and all issued bonds later in the year to the explanatory variables of year t . The estimation results appeared to be quite robust to these changes.

¹¹ More details on CA will be given in the next section. The fiscal data are taken from the AMECO database and are in the definition of the EDP.

¹² We also used the issue size as an alternative proxy for liquidity, but since this variable shows insignificant coefficients, we exclude it from reported regression analysis. The other regression coefficients remained unaffected.

We tested whether we can pool DM/Euro and US\$ bonds into one data set.¹³ We find that, except for the effects of corporate-government spreads, pooling is permissible. Thus, we estimate for the variable *corspread* for both currency groups separate slope coefficients. To do that, we add a variable to our regression that interacts the variable *corspread* with a dummy that takes the value one, if a bond is issued in US\$.

Finally, we include country dummies to control for unobserved country characteristics. This is especially relevant in the current context, as some countries have a reputation of frequent fiscal misreporting. The coefficients of creative accounting in the regressions including country dummies thus really capture the change of the country's risk premium due to the new signal. It does not capture the bad reputation of that country.

III CREATIVE ACCOUNTING AND FISCAL TRANSPARENCY

Creative accounting

Measuring creative accounting is by definition difficult as it is an unpublished and hidden fiscal activity. Therefore, in our empirical exercise, we have to resort to approximate measures for the true extent of creative accounting. We employ two different measures, both measures only approximate the true extent of creative accounting. Both measures come from generally available information sources and therefore represent 'news' signals to the financial markets. The first one is a noisy measure of creative accounting, namely stock-flow adjustments in percent of GDP. Following von Hagen and Wolff (2006), they are calculated from equation (5) as the difference between the change in the debt level B and the deficit D .

$$B_t - B_{t-1} - D_t = SFA_t \quad (5)$$

The advantage of this measure is that it captures all events that have an effect on the debt level without being recorded in the budget. This advantage is also the measure's main weakness, as some operations might not reflect the attempt to improve the books but result from purely technical problems that do not necessarily have an effect on the default probability of a country.¹⁴ Overall, these 'noisy' parts of the measure are probably random and should tend to cancel out over time (European Commission, 2003, p. 79). Von Hagen and Wolff (2006), however, show that stock-flow adjustments observed in Europe are on average positive over long periods of time. They also show that SFA is actively used by governments as a creative accounting tool. Buti *et al.* (2006) extend and confirm these results. This creative accounting part contained in SFA should have a significant effect on interest rates, if it is recognized by financial markets as increasing the risk of default.

¹³ That means that we test whether the effects of the independent variables on the spreads are the same for both currency groups.

¹⁴ For example, positive SFA resulting from exchange rate re-valuation of foreign denominated debt are connected with a change in the ability of governments to service the debt, while positive SFA resulting from building up assets leaves the default probability unaffected.

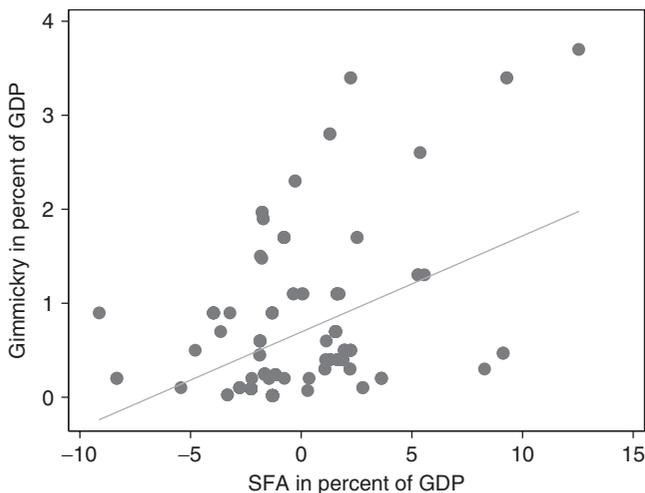


Figure 1. Measures of creative accounting. Notes: The relation between stock-flow adjustments and fiscal gimmickry taken from Koen and van den Noord (2005) in percent of GDP, when gimmickry is observed.

As a second measure of creative accounting, we employ the data presented in Koen and van den Noord (2005), who collect individual one-off measures to window dress the budget. The measure, called ‘fiscal gimmickry’, is a non-exhaustive inventory of events that have become public knowledge through media coverage. It is a more ‘fine tuned’ measure of creative government activities than SFA. However, it is very likely, that many of such operations are unnoticed by news agencies and are therefore not collected in this database. Thus, while SFA probably captures a broader range of creative accounting but is measured with noise because of ‘non-creative’ parts of SFA, ‘fiscal gimmickry’ is a ‘pure’ measure of creative accounting but captures only the window-dressing activities that became public knowledge and have been collected in the database.

Figure 1 shows the relationship between stock-flow adjustments and one-off measures as collected by Koen and van den Noord (2005). We can clearly see a positive relationship, suggesting that the two measures probably both give similar and valuable information of creative accounting.

Summary statistics of our two creative accounting variables are shown in Table A1.

Fiscal transparency

Fiscal transparency is an important concept, which is, however, difficult to measure. A concept of fiscal transparency is defined e.g. in the IMF manual on fiscal transparency.¹⁵ This definition, which emphasizes being open to the public

¹⁵ <http://www.imf.org/external/np/fad/trans/manual/intro.htm>

about the structure and functions of government, fiscal policy intentions, public sector accounts, and fiscal projections is based on Kopits and Craig (1998).¹⁶

In our paper, we think of transparency in a more narrow sense as influencing the relative information content of the official deficit signal and further creative accounting news. This narrower concept is also used to define transparency by Poterba and von Hagen (1999, pp. 3–4): ‘A transparent budget process is one that provides clear information on all aspects of government fiscal policy. Budgets that include numerous special accounts and that fail to consolidate all fiscal activity into a single ‘bottom line’ measure are not transparent. Budgets that are easily available to the public and to participants in the policymaking process, and that do present consolidated information, are transparent.’

We capture the concept of informational transparency with two measures. One is a newly developed index of auditing, called *Audit*. This index is calculated on the basis of the answers collected by an OECD and World Bank survey conducted in 2003.¹⁷ *Audit* measures whether governments are financially audited externally, how independent the auditing can be performed and how well the obtained information is disseminated.

The other index used is based on a part of the indicator developed in the seminal paper by von Hagen (1992), extended in Hallerberg *et al.* (2001) and updated in Hallerberg *et al.* (2005). We call this indicator *Transparency*, it is a measure of informativeness and transparency of the budget draft and includes an assessment of transparency given by government officials, the degree to which special funds are included in the budget draft, the information whether the budget consists of one document, whether it is linked to national accounts and finally whether government loans are included.

In comparison to *Audit*, *Transparency* is up-dated twice over the investigated time period, and therefore also takes the development of ‘budgetary transparency’ over time into account. Hallerberg *et al.* (2005) show that there has been a general increase in the level of transparency in Europe over the covered time period. Figure A1 compares the two measures of fiscal transparency for the year 2003. As can be seen, both are positively correlated. Table A1 describes the descriptive statistics of these two transparency variables.

For both measures of fiscal transparency, we expect a negative impact on default risk premia asked by financial markets. Thus, the better governments are audited and the better the public information on the budget, the lower the spread. The hypothesis underlying this prediction is that financial markets know

¹⁶The IMF code includes four general principles of fiscal transparency. The first general principle, Clarity of Roles and Responsibilities, is concerned with specifying the structure and functions of government, responsibilities within government, and relations between government and the rest of the economy. The second general principle, Public Availability of Information, emphasizes the importance of publishing comprehensive fiscal information at clearly specified times. The third general principle, Open Budget Preparation, Execution, and Reporting, covers the type of information that is made available about the budget process. The fourth general principle, Assurances of Integrity, deals with the quality of fiscal data and the need for independent scrutiny of fiscal information.

¹⁷A detailed description of the derivation of this index is provided in the appendix of the discussion paper version of this paper, see CESifo working paper 1732, 2006.

about transparency and will penalize in-transparent institutions, as they have less information on the true state of public finance. Furthermore, more transparency might increase the bargaining power of lenders in case of debt restructuring and thereby lower the risk of losing out completely on a credit.

Figures A2 and A3 suggest that there exists a negative relationship between fiscal transparency and creative accounting (confirming the model-based predictions by Milesi-Ferretti, 2003). Thus, a country with a highly transparent budgetary process uses less fiscal window-dressing activities than a less transparent country. A logit regression between a binary variable, that takes the value of 1 if a country used fiscal gimmickry and zero otherwise, and the *Transparency* index confirms this result. However, the causality between these two variables is unclear. It might be that lower scores on fiscal transparency raise the odds of gimmickry, because the probability of detection is small. Alternatively, countries that have less incentive/need to hide parts of their fiscal position might introduce a highly transparent budgetary process to signal their trustworthiness to financial markets.

A simple correlation analysis between spreads and the two measures of creative accounting provides first evidence, that there exist a significant positive relationship between interest rates and hidden fiscal policy. For stock-flow adjustments this positive correlation is significant at a 5% level, while for gimmickry it is significant at a 1% level. The next section provides more econometric evidence on these effects.

IV RESULTS

Baseline results

Tables 1 and 2 present our estimation results and differ in the choice of the creative accounting variable. All regressions are estimated with country fixed effects to control for unobserved country characteristics.¹⁸ Our results confirm the previous results of Bernoth *et al.* (2004). Deficits significantly increase risk premia.¹⁹ According to column A in both the tables, a deficit differential of five percent relative to the benchmark country explains a yield differential of around 20 basis points. However, the significant negative coefficient on *deficit* \times EMU indicates that with EMU the effect of deficits on risk premia is significantly reduced. In fact, an *F*-test on the sum of the coefficients for *deficit* and *deficit* \times EMU does not allow to reject the null hypothesis of no influence of the deficit on the spread with an EMU membership.

Before 1999 and for non-EMU countries thereafter, we find a significant and positive effect of fiscal gimmickry on government bond yields. The coefficient for stock-flow adjustments shows as well the expected positive sign, but is significant at the 10% significance level in only three out of five regressions. A possible

¹⁸ We also performed the regressions without country fixed effects to exploit the cross-country dimension of our data. The estimation results are qualitatively similar and are available from the authors on request.

¹⁹ Only in two regressions deficits become insignificant since their effect cannot be separated from the effect of fiscal transparency.

Table 1

Creative accounting, fiscal transparency and risk premia in government bond markets

	A	B	C	D	E
Deficit	3.98 3.15	3.66 2.04	3.69 2.06	4.18 3.41	4.14 3.72
SFA	0.50 1.74	0.48 1.65	0.96 0.84	0.47 1.67	0.56 1.43
Debt(-1)	0.18 1.14	0.12 0.67	0.11 0.58	0.07 0.79	0.07 0.9
Liquidity	- 0.88 -2.32	- 0.92 -2.44	- 0.99 -2.26	- 0.59 -1.57	- 0.60 -1.61
Corspread	0.05 0.96	0.05 0.92	0.04 0.84	0.04 1.15	0.05 1.17
US	- 40.40 -3.68	- 40.63 -3.5	- 41.70 -3.42	- 47.61 -5.33	- 47.15 -5.28
Corspread × US	0.40 6.5	0.40 6.29	0.41 6.07	0.40 8.26	0.40 8.26
Cycle	- 3.30 -2.67	- 3.40 -2.76	- 3.54 -2.84	- 3.76 -3.09	- 3.85 -3.28
Maturity	0.83 2.78	0.80 2.61	0.80 2.6	0.79 2.71	0.80 2.73
EMU	- 13.28 -2.18	- 12.80 -2.13	- 13.02 -2.14	- 9.45 -1.62	- 9.17 -1.68
Deficit × EMU	- 4.49 -3.05	- 4.09 -2.09	- 4.20 -2.07	- 3.81 -2.82	- 3.90 -2.75
SFA × EMU	- 1.35 -2.43	- 1.36 -2.46	- 1.34 -2.43	- 0.68 -1.35	- 0.80 -1.29
Debt(-1) × EMU	- 0.13 -0.86	- 0.18 -1.11	- 0.17 -1.1	- 0.11 -0.98	- 0.13 -1.08
Liquidity × EMU	1.03 2.29	1.14 2.7	1.17 2.65	0.66 1.63	0.66 1.67
Transparency		- 14.89 -0.73	- 17.38 -0.91		
Transparency × SFA			- 0.72 -0.46		
Audit				- 37.95 -3.26	- 35.53 -2.9
Audit × SFA					- 1.13 -0.45
Cons	12.19 1.37	25.78 1.17	29.42 1.42	18.45 2.33	17.10 2.21
Country dummies	Yes	Yes	Yes	No	No
<i>N</i>	235	234	234	234	234
<i>r</i> ²	0.65	0.66	0.66	0.60	0.60

Notes: Coefficients in bold, *t*-values below the coefficients. Regression without country dummies include a constant. Creative accounting measured by SFA.

explanation for the weak significance of stock-flow adjustments is that this measure of creative accounting is, as described earlier, a noisy measure for creative accounting. Financial markets thus penalize a government for larger creative accounting. Conversely, if a country has lower stock-flow adjustments than the

Table 2

Creative accounting, fiscal transparency and risk premia in government bond markets

	A	B	C	D	E
Deficit	2.58 3.41	1.09 1.11	0.64 0.73	2.01 2.59	2.08 2.9
Gimmickry	17.20 3.96	20.50 4.39	43.98 6.05	22.53 4.94	20.51 5.08
Debt(-1)	-0.06 -0.46	0.02 0.15	0.07 0.52	-0.05 -0.66	-0.04 -0.55
Liquidity	-0.49 -1.85	-0.49 -1.8	-0.35 -1.42	-0.24 -0.99	-0.19 -0.86
Corspread	0.00 -0.02	0.05 0.89	0.04 0.79	0.02 0.6	0.03 0.74
US	-54.42 -5.27	-45.75 -4.31	-43.45 -4.07	-56.08 -6.32	-52.12 -5.89
Corspread × US	0.47 8.16	0.42 7.28	0.41 7.11	0.44 8.96	0.42 8.65
Cycle	-1.00 -0.78	-0.75 -0.57	-0.82 -0.65	-1.13 -0.77	-1.04 -0.71
Maturity	1.18 3.65	1.18 3.61	1.20 3.74	1.07 3.82	1.07 3.88
EMU	2.34 0.5	-0.07 -0.02	-0.81 -0.18	3.12 0.71	2.40 0.55
Deficit × EMU	-1.89 -2.07	-0.14 -0.11	0.49 0.45	-1.28 -1.45	-1.28 -1.5
Gimmickry × EMU	-24.28 -5.66	-27.61 -5.98	-27.70 -6.92	-26.69 -5.91	-26.14 -6.48
Debt(-1) × EMU	0.16 1.36	0.16 1.41	0.26 2.07	0.14 1.43	0.09 0.87
Liquidity × EMU	0.35 1.16	0.55 1.76	0.50 1.69	0.03 0.09	0.12 0.41
Transparency		-41.08 -2.52	-29.85 -1.73		
Transparency × gimmickry			-37.78 -2.75		
Audit				-41.36 -3.61	-19.54 -1.29
Audit × gimmickry					-16.81 -2.33
Cons	-22.30 -1.47	3.98 0.2	-4.87 -0.24	13.05 1.73	8.64 1.11
Country dummies	Yes	Yes	Yes	No	No
<i>N</i>	208	208	208	207	207
<i>r</i> ²	0.74	0.75	0.76	0.71	0.71

Note: Coefficients in bold, *t*-values below the coefficient. Regressions without country dummies include a constant. Creative accounting measured by Gimmickry.

benchmark country, financial markets tend to reward this with lower interest rates spread. All in all, we can summarize that financial markets recognize window-dressing of governments and are not completely fooled. Financial markets thus demand higher interest rates if a government uses creative accounting.

Interestingly, the effects of the two different CA measures and the effects of the deficit are quantitatively substantially different. While an increase in stock-flow adjustments by 1% of GDP increases the spreads by less than one basis point (and is not always significant), the effect of an equivalent increase in gimmickry amounts to up to 20 basis points. Increasing the deficit by one percentage point will lead to an increase of the spread by roughly three basis points. The difference in coefficient size needs to be explained. In fact, if all three variables were perfect measures of the factual deterioration of the fiscal stance of the economy, they should all equally affect the probability of default. The estimated coefficients should be the same as they measure the increase in the spread due to the equally increased default probability.

The difference in coefficient sizes can result from two sources. First, SFA is a very rough measure of creative accounting. It is well known, that if a variable is measured with error, the coefficient is biased towards zero (the so-called attenuation bias). If SFA measures the actual deterioration of the fiscal position with more noise than the deficit, and if the noise is well-behaved, the difference in size of the coefficient vis-a-vis the deficit coefficient might actually result from this attenuation bias. The estimated coefficient for SFA is thus a lower bound for the true impact of creative accounting on spreads.

However, the argument that the attenuation bias also explains the discrepancy between the coefficients of SFA and gimmickry does not seem to be plausible. SFA must be extremely noisy to actually explain the huge difference in these two coefficients. Therefore, we believe that the large size of the fiscal gimmickry coefficient must result from something else. The data on which 'gimmickry' is based come from creative accounting events that become public knowledge in the media. Apparently, financial markets react more strongly to these events than to more hidden creative accounting, which we capture with SFA. Figure 1 indicates why the reaction to SFA should be smaller than to gimmickry. As can be seen, gimmickry increases less than one-to-one compared with SFA.²⁰ This implies that the coefficient of SFA should be lower than the one of gimmickry. Probably, financial markets assume that the gimmickry becoming public knowledge is just the tip of the iceberg. In this interpretation, gimmickry data represent a huge signal of additional hidden fiscal profligacy, which is penalized accordingly by financial markets.

After acceptance to EMU, the effect of cheating on the risk premium is significantly reduced, as indicated by the negative and significant coefficients on $SFA \times EMU$ and $gimmickry \times EMU$. Comparable to the weakening of the deficit effect, an *F*-test cannot reject the null hypothesis of no significant relationship between stock-flow adjustments and interest rate spreads after the start of EMU. Once inside the Euro, financial markets thus basically become indifferent to the cheating of individual EMU members.²¹

²⁰ An explanation for this is that a part of SFA consists of financial transactions which increases gross debt, but not net debt, so that there are fewer sustainability concerns.

²¹ Anecdotal evidence from significant deficit and debt data revisions in some countries in recent years confirms this finding as risk premia moved very little in these cases.

We do not find a significant relationship between the lagged debt level and the yield spread. This suggests that financial markets mostly react to the deterioration of the fiscal position and not to its overall level. A reasonable explanation is that the influence of the relatively time-invariant debt level on interest spreads is almost entirely absorbed in the estimated country-fixed effects.

Before EMU and for non-EMU countries after 1999, we find a significant liquidity effect on interest rate spreads in most regressions. According to column A, an increase of the relative debt market size by 5% causes a reduction of the yield spread by around four basis points. As indicated by the significant coefficients on *Liquidity* \times *EMU*, EMU-membership reduces the liquidity premium contained in government bond yields. A *F*-test does not reject the hypothesis that liquidity premia vanish with EMU. This result is in line with Pagano and Thadden (2004) and Favero *et al.* (2005), who also conclude that liquidity premia play a smaller role in explaining yield differentials after EMU membership. An explanation is that this results from the improved integration of markets, which lowers transaction costs. The conversion of all public debt of EMU countries into euros should overall increase the liquidity of securities markets, as a common currency improves the substitutability of government bonds of different countries and, hence, market size.

As indicated by the significant coefficient of *corspread* \times *US*, we find for yield differentials relative to the USA a significant effect of the general investors' risk aversion. The more risk averse investors are towards credit risk, which is indicated by a large spread between low-graded US corporate bonds and US government bonds, the wider is the interest differential between an EU country and the USA. For bond yield spreads relative to Germany, we do not find this effect. This shows that, contrarily to Germany, the USA enjoy a 'safe haven' status and that international factors have a significant effect on government bond yield spreads, which is in line with the results of e.g. Codogno *et al.* (2003), Gómez-Puig (2006) and Bernoth *et al.* (2004). The other control variables have the expected signs and will not be discussed further at this place.

Columns B and D in both tables extend the regression by two alternative measures for fiscal transparency. In all regressions with gimmickry, we find a significant reduction of the spread, the more transparent the budgetary process of a government is. An increase of the *Audit* as well the transparency measure taken from Hallerberg *et al.* (2005) by 1 SD causes a decrease of the yield differential by roughly six basis points.²² For both transparency measures, we find the statistical significance of the coefficients on creative accounting to remain unaffected. This shows that the significant results of creative accounting do not result from an omitted variable bias because of missing transparency proxies. Overall, our evidence suggests that fiscally more transparent countries have to pay lower risk premia. This evidence confirms the prediction by Kopits and Craig (1998) that financial markets can be more certain about a fiscally transparent government's ability and willingness to service its obligation and therefore demand lower risk premia.

²²Note, that we cannot control for country dummies in the regression with *Audit*, since *Audit* is time invariant. Moreover, the results on *Audit* are sensitive to the Greek observation.

In Columns C and E in Tables 1 and 2, we present the estimation results for gimmickry and SFA interacted with our two measures for fiscal transparency. We find a strong and significant negative effect for gimmickry interacted with *Audit* and *Transparency*. This indicates that financial markets are less worried about gimmickry of a transparent country. This probably means that gimmickry is not perceived as a very bad signal of the tip of the iceberg if the budgetary process of a government is relatively transparent. In terms of the model interpretation, improved auditing respectively transparency has a stronger effect on the reliability of the official signal as compared with the precision of the news signal. Fiscal transparency thus reduces the odds of the official fiscal position differing from the true one.

Our results provide evidence that financial markets care about creative accounting. Creative accounting results in higher risk premia. Because creative accounting measured by gimmickry is significant in all specifications with included country dummies, financial markets appear to value the *de facto* deterioration of the inter-temporal budget situation. This indicates that financial markets do not only take creative accounting exclusively as a signal of the country's general characteristics. They rather evaluate the actual deterioration of the fiscal position of the country resulting from creative accounting.

The different size of the coefficient for gimmickry and SFA provides some evidence, that public knowledge of this creative accounting plays a crucial role for financial markets. Recall that the gimmickry data are based on cases of fiscal cheating that made it in the news. These bad 'cheating-news' strongly degrade the perception of risk of a country. Financial markets' risk assessment is, however, less affected by gimmickry, the more transparent a country is.

Robustness checks

Table 3 shows IV regressions to address the potential attenuation bias resulting from the imprecise measurement of creative accounting through stock-flow adjustments. If the coefficient is downward biased because of the attenuation bias, we expect the coefficients on SFA to be larger in the instrumental variables regressions. We instrument SFA with fiscal gimmickry and find the expected result. The coefficient for SFA is now larger and closer to the one on fiscal gimmickry.

Our estimates might suffer from endogeneity if governments use creative accounting to 'fool' the financial markets. In this case, the estimated coefficients will be biased, as they are driven by reverse causality. In this view, governments engage in creative accounting when the spreads are larger in order to reduce the risk premium and the connected interest payments. While it is very likely that other factors, especially fiscal rules and electoral motives, determine the incentives of governments more than the relatively small spreads in the EU, we want to make sure that our coefficients are not driven by a possible reverse causality problem. Therefore, we perform a second sets of instrumental variable regressions in Table 3.

In the second set of IV regressions, we instrument SFA with political economy variables. It is reasonable to assume, that variables measuring political and especially institutional features of an economy are exogenous to the interest

Table 3

Instrumental variables regressions for stock-flow adjustments

	A	B	C	D
Deficit	5.48 1.84	5.83 0.73	4.41 2.83	4.50 2.65
SFA	11.97 2.21	7.91 0.43	1.40 1.17	1.83 1.67
Debt(-1)	0.61 1.53	1.59 0.37	0.08 0.72	0.21 0.82
Liquidity	0.68 0.42	0.38 0.17	-0.53 -1.06	-0.88 -1.73
Corspread	0.02 0.17	0.04 0.1	0.08 1.13	0.01 0.21
US	-27.88 -0.79	-8.47 -0.04	-23.94 -1.58	-38.94 -2.85
Corspread × US	0.34 2	0.34 0.39	0.27 2.93	0.40 4.84
Cycle	-21.06 -1.8	-15.20 -0.56	-0.62 -0.19	-3.17 -1.4
Maturity	1.30 1.67	2.33 1.29	0.84 2.05	1.21 2.93
EMU	-4.12 -0.23	12.88 0.36	-12.27 -1.37	-8.10 -1.06
Deficit × EMU	-3.79 -0.99	-16.36 -1.61	3.86 1.13	-2.53 -0.46
SFA × EMU	-10.54 -1.91	-13.99 -0.97	4.92 1.52	-0.31 -0.07
Debt(-1) EMU	-0.60 -1.26	-0.17 -0.31	-0.05 -0.27	-0.06 -0.26
Liquidity × EMU	-0.36 -0.23	-0.07 -0.02	0.21 0.39	0.62 1.09
Cons	1.23 0.04	-36.89 -0.1	9.74 0.83	33.02 1.12
Country dummies	No	Yes	No	Yes
Instruments	Gimmickry gimmickry × EMU		Transparencymh FisGovStructure elect2 vetoman	
N	208	208	225	225

Note: *t*-values below the coefficient.

rate spread. They are, however, very likely to be connected to the amount of creative accounting. In particular, we employ the transparency measure *Transparency*, a dummy variable taking the value 1 in election years, a variable measuring the quality of the budget process and a variable for the raw ideological distance (*vetoman*) within a government.²³ Following Hallerberg

²³ Thanks to Mark Hallerberg for providing us with the data on raw ideological distance. Raw ideological distance is measured according to the Manifesto Project, which codes the distance among parties based on their election manifestos in multiple dimensions.

(2004), we expect better budgeting institutions to contribute to lower use of SFA, while governments might be particularly tempted to use SFA in election years. Finally, we expect that the larger the ideological distance in a government, the more difficult it will be to agree on hiding parts of the budget from the books. The first stage regressions confirm these predictions. As Table 3 shows, the instrumented SFA has the expected effect on the spread and is statistically significant when controlling for country dummies. We are therefore confident, that our measured coefficients on creative accounting are not driven by reverse causality.

V CONCLUSIONS

We investigate, whether financial markets take into account creative accounting activities, when pricing default risk premia contained in government bond yields. With a simple model we show that interest rate differentials between two countries increase with a relative worsening of the fiscal position. The model is augmented to account for fiscal creative accounting and fiscal transparency. Creative accounting appearing in the media constitutes a news signal. The more reliable this signal, the greater will be the effect of creative accounting on the expected fiscal position of a country. Creative accounting news should therefore increase the default risk premium. Fiscal transparency should reduce spreads through lowering of uncertainty of fiscal policy. In addition, it influences the relative information content of the official and the news signal as more transparent countries probably provide more reliable official data.

The empirical results confirm the hypotheses derived from the model. Creative accounting increases risk premia. The gimmickry events, that make it in the financial news, have strong punishing effects on risk premia. This is especially true, if a country is in-transparent, as financial markets then take gimmickry as a 'tip of the iceberg' signal. Creative accounting thus increases the cost of borrowing significantly, if it becomes known, especially if financial markets are unsure about the true extent of creative accounting. Deficits and creative accounting are penalized less in EMU. There are two potential reasons for this. The first relates to a significant improvement of the fiscal institutions in Europe that increases credibility and thereby reduces the importance attached to deficit figures. The second might be a perceived increase in the likelihood of a bail-out. Research by Hallerberg and Wolff (2008) suggests that improved fiscal institutions can explain the lower penalty levels of debt and deficits in EMU. Overall, our results suggest that public authorities should increase their effort to monitor fiscal policy and to publicly stress the importance of sound fiscal policies.

The results highlight the importance of fiscal transparency for the credibility of governments. More transparent governments benefit from a significantly lower risk premium. Moreover, our results show that financial markets penalize fiscal misreporting heavily, which suggests that they are not fooled.

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APPENDIX

The estimation framework in detail

Recent work by Koen and van der Noord (2005) and von Hagen and Wolff (2006) suggests that governments systematically use creative accounting to beautify their fiscal position. Creative accounting consists of two parts:

$$CA_t = c + \varepsilon_t \quad (\text{A1})$$

where c is a constant and measures the average use of creative accounting of a country, and ε_t is a zero mean normally distributed error term. We assume that c is common knowledge to financial markets.

Governments announce officially their fiscal state, $F_t^{official}$, before news agencies and other institutions publish their appraisal of the country's fiscal position, F_t^{other} . The difference between the official statement and the actual fiscal situation of the government is defined as creative accounting:

$$F_t - F_t^{official} = CA_t \quad (\text{A2})$$

Combining equations (A1) and (A2) yields the 'prior belief' of financial markets about the fiscal position of a country before additional information revealed by news agencies that is based on the official announcement of the government:

$$\tilde{F}_t^{official} = F_t - \varepsilon_t \quad (\text{A3})$$

where $\tilde{F}_t^{official} = F_t^{official} + c$. Thus, the mean forecast of this prior belief is described by $\tilde{F}_t^{official}$, which is the official announced fiscal state corrected by the average, expected use of creative accounting, and has a precision of $\mu_t = \sigma_\eta^2$, with σ_η^2 denoting the variance of ε .

After the release of official fiscal statistics by the government, financial markets receive additional information about the fiscal situation of a country from news agencies and other institutions that closely monitor government activities. This second announcement is as well a noisy estimate of F_t :

$$F_t^{other} = F_t + \rho_t$$

where ρ_t denotes a zero mean normally distributed error term with variance σ_ρ^2 .

Following Bayesian inferences the markets' expectation about the actual fiscal position can then be described as follows:

$$\begin{aligned}
 E(F_t) &= \frac{\mu \tilde{F}^{official} + \beta F_t^{other}}{\mu + \beta} \\
 &= \tilde{F}^{official} + \frac{\beta}{\mu + \beta} (F_t^{other} - \tilde{F}^{official}).
 \end{aligned}
 \tag{A4}$$

Description of variables

The inclusion of an indicator of the cyclical stance (*cycle*) is motivated by the idea that default risk depends on the overall economic situation of a country. In an economic slow-down, government revenues decrease, while expenditures increase, and the probability of default may rise. Our indicator takes the value 1, when the nominal GDP of a country is more than half a SD above its trend (boom), (-1) when it is more than half a SD below its trend (recession), and 0 otherwise. The *cycle* variable included in the regression is calculated as the difference of this indicator between the issuer and the benchmark country. Thus, *cycle* is zero, if both countries are in the same cyclical position; it is (-2) and (2) , if one is in a strong boom and the other in a strong recession, and (-1) and (1) in the case of less severe differences in the cyclical stance.

As suggested by our model as well by several empirical studies,²⁴ one important determinant of yield spread between countries is the general investors' risk aversion towards credit risk. Since investors' risk aversion is not directly observable, we use, similar to Codogno *et al.* (2003), Favero and Giavazzi (2004), and Bernoth *et al.* (2004), the yield spread between low-grade US corporate bonds (BBB) and benchmark US government bonds as an empirical proxy. A rise in this spread indicates an increase in the investors' risk aversion, and vice versa.

We expect that an investor demands a compensation for investing in long-term bonds instead of buying short-term bonds as the default risk increases with time to maturity. Given that our data set contains bond issues with different times to maturity, this motivates the inclusion of a *maturity* variable to our regression equation, which measures the time to maturity of the bonds at the time of issue.

²⁴E.g. Dungey *et al.* (2000) provide strong evidence of a common international factor in many yield differentials. Codogno *et al.* (2003) and Pagano and Thadden (2004) also note considerable co-movement of yield spreads, probably driven by international risk factors. Bernoth *et al.* (2004) confirm as well that interest differentials between EU countries are significantly affected by international risk factors and that the USA enjoy a 'safe haven' status.

Table A1
Descriptive statistics and sources of the variables

Variable	Description	Average	SD	Min	Max
Spread S_{it}	The spread between the yield of a government bond issue of an EU country and a comparable government bond issued in the same currency related to the gross nominal return of the government bond issue. Expressed in basis points. Compare equation (11). <i>Source</i> : Capital DATA Bondware	37.29	28.56	-5.00	156.00
Deficit	Difference of deficit to GDP (including debt service payments) at the end of the fiscal year between the issuer country and the benchmark country. <i>Source</i> : European Commission (Ameco database)	-0.15	3.14	-8.10	10.30
Stock-Flow-Adjustment	Difference of stock-flow adjustment to GDP at the end of the fiscal year between the issuer country and the benchmark country (expressed in percent). <i>Source</i> : European Commission (Ameco database)	0.51	6.44	-14.67	14.24
Gimmickry	One-offs, creative accounting operations affecting fiscal balances collected by Koen and van der Noord (2005). Expressed in percent of GDP	0.47	0.77	0.00	3.70
Debt (lagged)	Difference of lagged debt to GDP outstanding at the end of the fiscal year between the issuer country and the benchmark country (expressed in percent). <i>Source</i> : European Commission (Ameco database)	13.86	26.63	-44.05	87.88
Audit	Measures the degree to which fiscal book keeping is being audited and the extent to which this information is disseminated.	0.04	0.19	-0.56	0.27
Transparency	Measures the informativeness of the budget draft. Taken from Hallerberg <i>et al.</i> (2005).	0.63	0.16	0.25	1.00
Corp. spread	Spread between 7 and 10 years low-grade corporate bonds (BBB) and 7-10 government bonds in the US to the time of issuance (expressed in basis points). <i>Source</i> : Datastream	170.95	43.98	113.00	289.00
Maturity	Time to maturity of the government bond issue measured in years. <i>Source</i> : Capital DATA Bondware.	7.32	4.94	1.60	32.50
Liquidity	The ratio of the total debt of the issuer country over the total debt of the EU issued in DM/Euro or US\$. <i>Source</i> : DBSONline, BIS and own calculations.	13.64	12.89	0.11	53.82
Business cycle	The difference of the business cycle variable between the issuer country and the benchmark county, which collates the value 1 when the detrended and standardized nominal GDP is bigger than 0.5, the value -1, when it is smaller than -0.5 and 0 otherwise.	-0.05	1.05	-2.00	2.00

Graphs

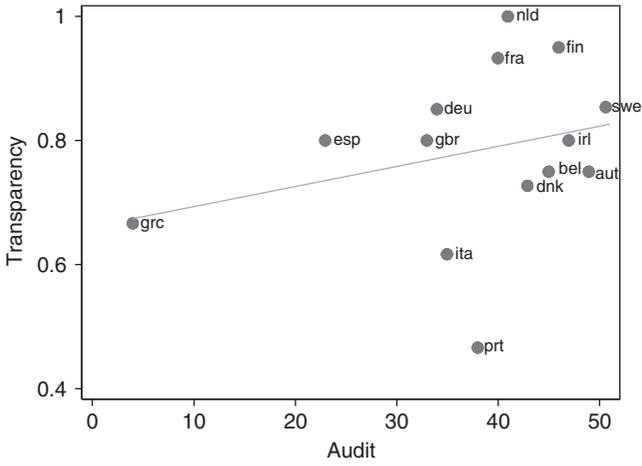


Figure A1. Comparison of two indices of fiscal transparency.

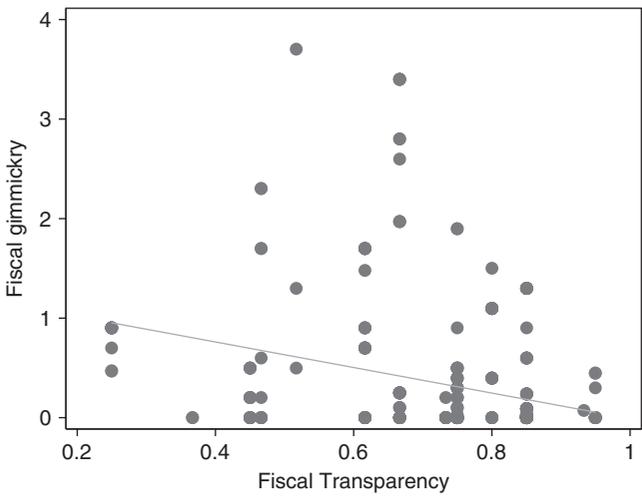


Figure A2. Fiscal gimmickry as a function of transparency.

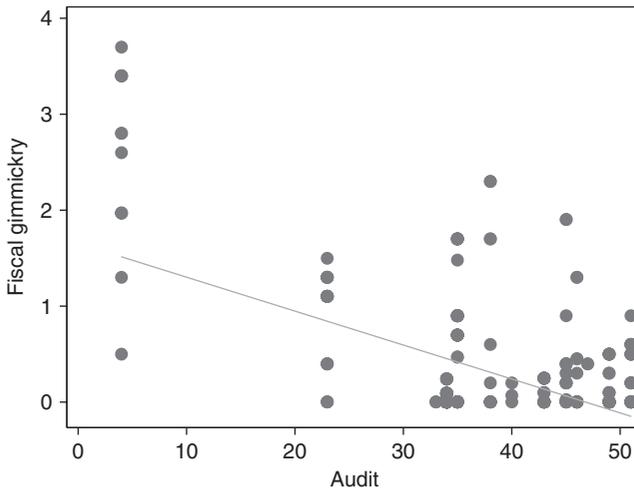


Figure A3. Fiscal gimmickry as a function of Audit.

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