Market Consequences of Sovereign Accounting Errors

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Abstract: This paper investigates the market consequences of sovereign accounting errors, opening a new area of research on sovereign accounting quality in the accounting literature. Eurostat, a division of the European Commission, provides semi-annual assessments of financial reports produced by the member states of the European Union (EU), and issues reservations that detail financial reporting errors. Using a sample of Eurostat reservation issuances across 28 EU countries from 2004-2018, we find that sovereign bond yields abnormally increase during a reservation announcement window, especially when a reservation explicitly mentions deficit or debt, when it quantifies the extent of errors, or when the errors relate to recent fiscal data. Consistent with a home bias after the release of negative news, we find that domestic holdings of sovereign debt increase after the issuance of a reservation. Overall, our evidence suggests that sovereign accounting errors have significant market consequences and raises further questions for future research in sovereign accounting quality.

1. Introduction

Sovereign debt is a significant and growing asset class, with worldwide outstanding sovereign debt growing 14.6% to $83.5 trillion in 2020 and representing 98.6% of the global GDP (International Monetary Fund 2021). This study examines an unexplored facet of sovereign debt, namely whether debt investor activity reflects concerns about a sovereign entity's accounting quality. Major investors of sovereign debt in advanced economies include domestic and foreign commercial banks, central banks, and institutional investors such as pension funds (Arslanalp and Tsuda 2012). Therefore, the creditworthiness of sovereign debt is an important factor that can impact global economic health and stability.[1]

Accounting quality has been shown to be important for both corporate debt contracting (e.g., Bharath et al. 2008; Graham et al. 2008) and local government debt costs (Baber et al. 2013, Beck 2018). However, the importance of accounting quality for sovereign debt reporting is less clear. On the one hand, it is possible that sovereign accounting quality does not matter as much as corporate and local government accounting quality, as most of the recent sovereign debt defaults come from only a few "serial default" countries (Tomz and Wright 2013). Moreover, the practitioner literature has found that government reporting of financial information is typically less rigorous than corporate reporting which must follow independent standards and is scrutinized by short sellers, proxy advisors, auditors, and sell and buy side analysts (Bernstein et al. 2020).[2] On the other hand, investors may have an incentive to

[1] The Bretton Woods Committee called for an urgent need to reform sovereign debt-related disclosures on 31 Jan 2022. More details can be found at https://www.brettonwoods.org/article/debt-transparency-the-essential-starting-point-for-successful-reform

[2] https://www.forbes.com/sites/shivaramrajgopal/2021/01/04/the-sovereign-debt-market-ignores-

care about sovereign accounting quality as sovereign creditors have fewer rights and face more protracted and costly debt renegotiations than corporate creditors (Shleifer 2003). Thus, sovereign fiscal reporting quality should be reflected in the cost of debt (Bernoth and Wolff 2008). As this discussion suggests, it is still an open question whether sovereign accounting quality matters to investors.

Research on the importance of sovereign accounting quality faces challenges in how to measure this quality accurately (e.g., Bernoth and Wolff 2008; Seiferling 2013). To address this issue, our study draws on reports provided by Eurostat that allow us to exploit a special feature in the European regulatory environment. In the European Union (EU), national statistical institutes (NSIs) produce consolidated national fiscal data that is subject to routine monitoring and scrutiny by Eurostat, a dedicated division of the European Commission (EC). Eurostat fills a number of functions in assessing the data provided by sovereign entities. In particular, it produces biannual assessments of the quality of fiscal data reported by member states, issues reservations on specific national accounting issues, and occasionally requires countries to amend originally-submitted data.[3] This data quality check is especially important in mitigating any potential incentives to manipulate fiscal reporting in order to appear compliant with EU constitutional deficit and debt ceilings (Bernoth and Wolff 2008).[4] Furthermore, the EC requires its sovereign states to follow a set of accounting standards (ESAs), allowing easier comparability of member state fiscal data (Wang 2014). This supranational, independent body tasked with monitoring and assessment of sovereign accounting quality is unique in the world. The reservations issued by Eurostat share similar features with the enforcement actions taken by the Securities and Exchange Commission (SEC) in the US which follow established features of corporate accounting quality (Dechow et al. 2010, 2016, Naughton et al. 2018). However, there are also differences across the two systems.[5]

fundamentals/?sh=71a3b7c87097, https://thehill.com/opinion/finance/407633-think-our-20-trillion-debt-is-bad-get-a-load-of-the-real-number

[3] For ease of exposition, we term both reservations and amendments issued by Eurostat as reservations, except when we discuss amendments separately.

[4] The stability and growth pact (SGP) imposes a deficit-to-GDP and debt-to-GDP limit on EU countries of 3% and 60%, respectively, and involves both preventive measures in terms of guidance and monitoring as well as corrective measures in the form of Excessive Deficit Procedures (EDP) launched against non-compliant member states. In March 2020, the general escape clause of the Stability and Growth Pact (SGP) was activated. This clause allowed Member States to react to the COVID-19 crisis by providing sizeable fiscal support to their economies, temporarily departing from the SGP requirements.

[5] This EU-member state institutional setting cannot be viewed as parallel to the US federal-state system. While

Eurostat has published biannual assessments of the sovereign accounting quality of EU member states since 2004. In our study, we hand-collect details on 90 Eurostat-issued reservations that identify accounting quality deficiencies in member states' fiscal reporting for the period 2004-2018. Using this sample, we find that sovereign accounting errors do matter to the market. Specifically, we find that sovereign bonds experience, on average, 1% abnormally higher changes in yields around the announcement window of Eurostat reservations, after controlling for country fixed effects and stock flow adjustments (SFAs).[6] Previous studies suggest that high levels of SFAs, which represent the difference between the reported annual change in debt levels and the reported deficit, may signal sovereign accounting manipulation (Bernoth and Wolff 2008, von Hagen and Wolff 2006). Our results further show that the market response to reservations is concentrated in its response to newly expressed reservations, which contain new information for the market. Under the Eurostat issuance process, reservations are withdrawn when Eurostat is satisfied with countries' clarifications or amendments of originally submitted fiscal data. In our study, we do not find a statistically significant market reaction to withdrawn reservations. Our empirical results are consistent with the hypothesis that new reservations constitute new information about sovereign accounting quality to the market. By contrast, withdrawn or maintained reservations contain no new information for the market, as the originally flagged data either has been corrected or is expected to be.

We further hypothesize and find that investors react more to Eurostat reservations that: 1) explicitly mention errors in accounting for debt or deficit figures, 2) quantify the errors' financial impact, or 3) identify errors in recently published fiscal data. Finally, consistent with previous literature finding more pronounced home bias during deteriorating economic conditions in a home country (Giannetti and

the US has federal, state, and local monitoring institutions (e.g., the US Governmental Accountability Office (GAO) to audit federal accounting data and private auditors to monitor state and municipal financial reporting), there is no federal agency tasked with monitoring the accounting quality of individual states that would be parallel to Eurostat's monitoring of EU member states' accounting quality. Furthermore, SEC enforcement actions generally result in large fines while Eurostat reservations do not. Finally, Eurostat has the power to unilaterally restate an EU member state's fiscal data if the original submission would result in the country violating EC fiscal rules such as public debt and deficit ceilings.

[6] The findings in Table IA.2 of the internet appendix also show that Eurostat is more likely to issue reservations to countries with the following characteristics: (i) higher SFAs, (ii) worse economic conditions, and (iii) a greater proportion of sovereign bonds held in central banks.

Laeven 2012), we find that domestic holdings of sovereign debt increase after the issuance of a reservation.

Our paper contributes to the literature in several important ways. First, we exploit the unique setting in the EU to identify a relatively unambiguous proxy for sovereign accounting quality, allowing us to mitigate measurement challenges. Our findings thus offer incremental contributions beyond those of existing SFA-based studies on fiscal reporting quality. SFAs are a noisy proxy for fiscal accounting quality for several reasons. First, similar to the use of accruals to proxy for corporate earnings manipulation (Armstrong et al. 2016, Richardson et al. 2006), many purely technical adjustments that impact debt levels are not recorded in the deficit. These transactions can result in positive SFAs even when there is no intentional manipulation of fiscal data. Also similar to accruals, SFAs typically reverse over time and thus may not be an accurate indicator of inferior sovereign accounting quality (European Commission 2003, Seiferling 2013). In addition to using to a more accurate measure of sovereign accounting quality, our event study methodology and regression design provide cleaner inferences regarding investors' reactions to negative news related to sovereign accounting quality as well as controls for SFAs. Our study also allows us to make broader assessments of market reactions to questions regarding sovereign accounting quality than the findings from Baber et al. (2013) who investigate the long-term interest rate effects of US municipal government restatements. In the US, individual retail investors represented 68% of total US municipal bond ownership in 2022 and thus the municipal bond market reflects a unique, highly cyclical investor demand pattern.[7] Therefore, it is not obvious that the findings from the US municipal bond market can be generalized to the worldwide sovereign debt market.

Second, given the importance of sovereign debt instruments to the global financial markets, our study provides timely evidence that sovereign accounting errors captured by Eurostat reservations provide novel information to investors that improves their ability to assess sovereign credit risk. Our evidence indicates that the cost of borrowing may become higher for countries after Eurostat raises concerns about their accounting quality, which can impact their ability to raise future debt. Both our

[7] Invesco's Primer on Municipal Bonds (https://www.invesco.com/us-rest/contentdetail?contentId=96ca582c5ed1d510VgnVCM100000c2f1bf0aRCRD&dnsName=us).

findings and anecdotal observations by industry experts suggest that sovereign bond ratings do not typically consider fiscal accounting quality. Thus, our main findings on market reactions to sovereign accounting quality provide incremental insight beyond that of studies on market reactions to sovereign bond rating downgrades (Afonso et al. 2012).

Finally, our study contributes to the literature on investors' home bias. A home bias typically denotes a preference by domestic investors for holding domestic investments compared to foreign investments as they face lower information asymmetry and information processing costs in the domestic market. Our findings suggest that Eurostat reservations regarding sovereign accounting quality are associated with greater home bias for the sovereign bonds of impacted countries.

2. Sample and Descriptive Statistics

2.1 Sample

Our sample of Eurostat reservation issuances covers 28 EU member states for the 2004-2018 period. As one of the first studies in the accounting literature to examine sovereign accounting quality, we draw on non-traditional existing databases as well as hand-collected data. From the Eurostat database, we hand-collect data on semi-annual sovereign accounting quality assessments and SFAs in addition to other variables such as public debt and public deficit/surplus. To obtain our data on sovereign bond yields, we use the 10-year government bond, end-of-day yield data from Datastream. Our GDP growth data comes from the World Economic Outlook (WEO) database published by the International Monetary Fund (IMF). Sovereign debt ownership data covering 16 out of the 28 EU countries is obtained from IMF estimates (Arslanalp and Tsuda 2012).[8] Panel A of Table 1 describes our sample selection methodology. First, we manually retrieve all available Eurostat semi-annual sovereign accounting quality assessments from Eurostat's website.[9] This initial sample of 811 assessments forms the basis for the reservation determinants and ratings downgrade tests reported in the internet appendix. For the market reaction tests, we first drop Germany, which is our benchmark country for calculating

[8] The 16 EU countries covered are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Slovenia, Spain, Sweden, and United Kingdom.
[9] Bulgaria, Romania, and Croatia do not have semi-annual publications for all 15 years of the sample period as they joined the EU after 2004.

abnormal yield changes. We further exclude Latvia and Estonia from our sample as they do not have 10-year sovereign bond yield coverage in Datastream for our entire sample period. Next, we eliminate any observations lacking yield data corresponding to assessment publication dates or within a three-day window thereafter. This procedure provides 625 semi-annual country observations for the market reaction tests. From this set, our ownership tests use a sample of 480 observations for the 16 countries for which ownership information is available.

Eurostat reservations are issued for a variety of reasons. For example, a reservation may question a country's reported deficit figures because of concerns related to possible downward revisions of tax revenues, under-recording of military expenditures, unrecorded payments to or from the EU budget, or missing dividends paid by state-owned corporations. Eurostat may also question reported debt figures by challenging capitalized interest figures or asset values of social security funds. Panel A of the Appendix presents two examples of Eurostat reservation events.[10] Event 1 details a reservation issued against France in April 2018. In this reservation, concerns are raised regarding the classification of a capital transfer to an energy company as well as the liabilities of a French international development agency. The source of the accounting problem is identified as improper accounting of public corporations, and the impact on both debt (balance sheet) and deficit (income statement) levels is quantified. Event 2 details a reservation issued against Greece in April 2010. In this reservation, concerns are raised regarding the reporting of a surplus from social security funds and the classification of certain liabilities related to public entities. Again, the impact on both the reported deficit (income statement) and debt (balance sheet) figures is quantified. Figures B1 and B2 of the Appendix summarize the most common issues raised by Eurostat reservations. The figures show that the top three issues raised in the reservations are inappropriate accounting of public corporations (32%), inappropriate accounting of public sector entities (29%), and incorrect reporting of bank capital injections (26%). We further see that these issues impact the income statement (deficit or surplus) 62% of the time and the balance sheet (debt or other balance sheet items such as working capital accounts) 56% of the time. Note that some issues can impact both income statements and balance sheets.

[10] In the internet appendix, we detail the 34 newly expressed reservations or amendments presented in Table 1, Panel C.

2.2 Descriptive Statistics

Panel B of Table 1 summarizes the distribution of the 71 reservations that we use in our main empirical analysis.[11] In the empirical analysis, *Reservation* is an indicator variable that equals one if a reservation or an amendment is included in a country's semi-annual fiscal reporting quality assessment by Eurostat during 2004-2018. In our sample period, 15 EU member states have at least one reservation or amendment.[12] These countries include Austria, Belgium, Bulgaria, Cyprus, Denmark, France, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Portugal, Romania, and the United Kingdom (UK). Of these countries, the UK and Greece have received the greatest number of reservations, with the rest broadly distributed across the remaining countries. Specifically, the UK has received 14 reservations (4 newly expressed) while Greece has received 12 (7 newly expressed).[13] Greece was the first country to receive a reservation from the EU in September 2004. In October 2009 and again in April 2010, Eurostat issued reservations that led to Greece revising its public debt and public deficit figures. The revised fiscal data fell well outside the EDP public debt and public deficit ceilings, leading to investor concerns about Greece's debt risk.[14] From our bond yields data, we observe that Greek sovereign bond yields increased by 56% in the 12 months following the October 2009 reservation.[15]

Examining the statistics in Panel C of Table 1, we see that most reservations in our sample are newly expressed (48%) with the rest roughly evenly distributed between maintained (27%) and withdrawn (25%) reservations. Note that 58% of the reservations in our sample are likely more relevant for investors as they report an impact on debt or deficit figures. In terms of precision, the impact of 46%

[11] Table IA. 1 in the internet appendix details the sample selection procedure which results in 71 Eurostat reservations conveying negative news. We exclude 6 events conveying positive news as the spirit of the reservations is mainly to discuss errors or inconsistencies in sovereign fiscal reporting.
[12] Untabulated summary statistics detail the distribution of reservations by year and show that reservations are generally evenly distributed across our sample.
[13] The rest of the reservations were maintained in subsequent periods because the UK did not respond to them in a timely manner. Economically, the UK has never been part of the European Monetary Union (EMU) and has kept its own currency and central bank. Therefore, the UK may not be as concerned about the possible economic consequences of Eurostat reservations related to fiscal reporting.
[14] See for example, the Financial Times (FT) article "History of statistics that failed to add up" on September 30 2011 (https://www.ft.com/content/deeaea88-eb81-11e0-a576-00144feab49a) and the FT article "Eurostat's bell tolls for Greek debt" on April 22, 2010 (https://www.ft.com/content/e3f2815a-1870-3bd9-8975-6ab293a479e1).
[15] We note that Eurostat signaled its ongoing concerns about the sovereign accounting quality of Greece for six years (2004 through 2010) prior to the European sovereign debt crisis.

of our reservations is quantified. In terms of the timeliness of the reporting errors specified in the reservations, 59% of reservations relate to contemporaneous or recent fiscal data.[16] Of the 71 events, 72% are reservations while 28% are amendments (untabulated).

3. Market Reaction to Eurostat Reservations

To perform our market reaction tests, we first define the daily change in yield (*Y*) of country *i* on day *d* as $chgY_{i,d} = \frac{Y_{i,d}}{Y_{i,d-1}} - 1$. Then, we calculate the daily abnormal change in yield (AchgY) from each event as follows: $\mathrm{AchgY_{i,d}} = \mathrm{chgY_{i,d}} - \mathrm{E(chgY_{i,d})}$, where $\mathrm{AR_{i,d}}$ is the abnormal change in yield of country i on day d, $\mathrm{chgY_{i,d}}$ is the observed change in yield of country i on day d, and $\mathrm{E(chgY)_{i,d}}$ is the predicted change in yield on this date. We compute the predicted change in yield $\mathrm{E(chgY)_{i,d}}$ using the following regression: $\mathrm{E(chgY_{i,d})} = \propto_{\mathrm{i}} + \beta_{\mathrm{i}} . \mathrm{chgY_{b,d}} + \varepsilon_{\mathrm{i,d}}$, where d represents our estimation window [-60, -30]. β_{i} is the beta, or our measure of the systematic risk of country i, and is stable over time; $\mathrm{chgY_{b,d}}$ is the daily change in Germany's yield ($\mathrm{chgY_{b,d}}$) as our benchmark, following Afonso et al. (2012); and $\varepsilon_{\mathrm{i,d}}$ is the error term. $\mathrm{AchgY_{i,d}}$ is computed as the cumulative abnormal change in yield $\mathrm{CAchgY_i}[\mathrm{t_1}, \mathrm{t_2}]$ from $\mathrm{t_1}$ to day $\mathrm{t_2}$ around the event: $\mathrm{CAchgY_i}[\mathrm{t_1}, \mathrm{t_2}] = \sum_{\mathrm{t=t_1}}^{\mathrm{t_2}} \mathrm{Achg_{i,t}}$. Figure B3 presents the cumulative abnormal change in yields for reservation versus non-reservation events for the [-1, 15] window. The results suggest that average $\mathrm{CAchgY_i}$ is positive around the reservation event windows and that this reaction does not appear to reverse up to 15 days after the event.

To test whether Eurostat reservations matter to investors, we regress announcement window [0, 1] $\mathrm{CAchgY_i}$ on *Reservation*, our variable of interest as defined above, while controlling for SFA, the noisy variable of fiscal accounting quality used in the existing literature. The coefficient on *Reservation* captures the market reaction to the issuance of Eurostat reservations. To control for time-invariant country-level effects, we include country fixed effects in our regression. We also cluster standard errors by country. In this test, we expect to find an increase in $\mathrm{CAchgY_i}$ around the announcement of a Eurostat

[16] Unlike corporate financial reports, most sovereign fiscal reports contain revisions of past financial data due to the time-consuming nature of the fiscal data estimation process. Eurostat reservations represent Eurostat's disagreement with a country reporting agency's interpretation of fiscal reporting rules.

reservation, reflecting the provision of novel negative information about a country's sovereign accounting quality. The results in Panel A of Table 2 show that the coefficients on *Reservation* in both columns (1) and (2), representing [0,1] and [-1,1] windows respectively, are positive and statistically significant at 5% confidence levels for the [0,1] window and 10% confidence levels for the [-1,1] window, providing support for our hypothesis.[17] The results in columns (3) and (4) show a positive coefficient, significant at 1% confidence levels, suggesting that the market reaction is mainly concentrated in its reaction to newly-expressed reservations, which contain the most novel information.[18]

Next, we examine whether the market reacts differently to different reservation characteristics. The results in column (1) of Panel B of Table 2 again show a statistically significant market reaction to reservations in the [-1,1] window. These results suggest that, for the [-1,1] window, the coefficients on *Reservation* are statistically significant only for reservations that indicate an impact on public debt or public deficit numbers, that quantify the impact, or that mention concerns about contemporaneous versus past fiscal data quality. F-tests of the equality of coefficients reveal that the coefficients on Deficit or Debt, Quantified, and Contemporaneous Error are higher than those on Not Disclosed, Non-Quantified, and Past Error, respectively, statistically significant at a minimum of a 10% confidence level. Taken together, these results suggest that reservations matter more to investors when they contain more relevant, precise, and timely information. An untabulated robustness analysis shows a market reaction to all reservations issued in the sample period, rather than only to those related to Greece, Ireland, Italy, Portugal, and Spain (GIIPS), the countries most affected by the European sovereign debt crisis of 2011. This is consistent with our finding that GIIPS countries account for only 28% of the reservations in our sample. The findings in Table IA.3 of the internet appendix, also show that credit ratings do not respond in a timely fashion after the issuance of Eurostat reservations. This result is consistent with European Securities and Markets Authority (ESMA) criticism of the usefulness and

[17] We also examine the [-1,0] announcement window to test whether the market anticipates the reservations. The coefficient on *Reservation* for the [-1,0] window is statistically insignificant, indicating that the market does not anticipate the reservations prior to their announcements.

[18] We also investigate whether the first expressed reservation for a country has a differential impact than subsequently expressed reservations, and do not find a difference. Anecdotally, Eurostat issued several reservations about Greece containing incrementally new information before the European sovereign debt crisis.

accuracy of sovereign ratings due to lack of independence, conflicts of interest, confidentiality, and lack of timeliness and resources in producing ratings publications.

Finally, we examine the impact of Eurostat reservations on home bias in sovereign debt holdings. The results in Table 3 suggest that domestic holdings of sovereign debt increase following the issuance of a reservation. We scale domestic debt holdings by the countries' respective annual GDP levels to control for the size of their economies, and find a positive and statistically significant variation in domestic debt holdings after controlling for SFA, change in debt, change in deficit, and GDP growth both three months (columns (1) and (2)) and twelve months (columns (3) and (4)) after a reservation.[19] This finding likely reflects greater domestic investor confidence about the local economy and fiscal reporting environment, and a willingness to take advantage of the increase in yields at reservation announcements that we document earlier in the study. These results are also consistent with the conjecture that investors tend to exhibit a home bias especially in the context of high information asymmetry or when the economic situation of the home country deteriorates (Arslanalp and Tsuda 2012, Chan et al. 2008, Gelos and Wei 2005, Giannetti and Laeven 2012).

In summary, our empirical evidence is consistent with the hypothesis that sovereign accounting quality matters to investors, and that they care more when the quality signal is more relevant, precise, and timely. Moreover, due to information asymmetry and home bias, we find an increase in domestic sovereign debt holdings after the issuance of a reservation.

4. Conclusions

Our study exploits a unique feature of the EU's monitoring of member states' fiscal data to investigate whether investors care about sovereign accounting quality. For our sample, we draw on reservations issued by Eurostat, an agency tasked by the EU with monitoring and assessing the financial reporting quality of EU member states, as an unambiguous proxy for inferior sovereign accounting quality. Using a sample covering 28 EU countries from 2004-2018, our empirical results suggest that

[19] An untabulated analysis suggests that the results are qualitatively similar if we change the scalar from GDP to population. Due to larger variance, the results become statistically insignificant at 10% confidence levels when debt ownership variables are scaled by a country's total debt outstanding.

sovereign accounting errors identified in Eurostat reservations offer novel and economically impactful information about the fiscal reporting quality of the affected countries.[20] Our results also indicate that the market reacts more to reservations that provide more relevant, precise, and timely information about accounting quality. In addition, we find some evidence of investors' home bias in sovereign debt markets. Our findings raise multiple avenues for future research on sovereign governance, disclosure environments, and sovereign accounting quality in a global setting.

[20] A caveat to our findings is that Eurostat reservations are relatively infrequent events and unique to European Union member states. This can limit the generalizability of our results to other regions of the world. Another caveat is that the fiscal accounting errors reported in Eurostat reservations affect reported fiscal information and therefore they represent a negative signal on a country's accounting quality as well as its fiscal health. This is analogous to SEC enforcement actions which represent a negative signal on a company's accounting quality as well as its financial health. Therefore, this limitation is common to extant literature on accounting quality.

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Appendix. Reservation Examples and Statistics

Panel A. Reservation Examples

Country, Date, and Details provided by Eurostat followed by small digest in italics prepared by authors
Event 1. France - 23 Apr. 2018 Eurostat is expressing a reservation. Firstly, in relation to the sector classification of the Agence Française de Développement, which Eurostat considers should be classified inside the general government sector. A future reclassification will result in an increase in government debt. Moreover, Eurostat considers that the capital injection by the State into AREVA (NewCo/Orano) for an amount of €2.5 bn (0.1% of GDP) in 2017 should be treated as a capital transfer, with an impact on the deficit. *Problem identified: Public corporation | Impact: Income Statement, Balance Sheet*
Event 2. Greece – 22 Apr. 2010 Eurostat is expressing a reservation on the quality of the data reported by Greece, due to uncertainties on the surplus of social security funds for 2009, on the classification of some public entities and on the recording of off-market swaps. Following completion of the investigations that Eurostat is undertaking on these issues in cooperation with the Greek Statistical Authorities, this could lead to a revision for the year 2009 of the order of 0.3 to 0.5 percentage points of GDP for the deficit and 5 to 7 percentage points of GDP for the debt. *Problem identified: Public entity | Impact: Income Statement, Balance Sheet*

Panel B. Reservation Statistics and Cumulative Abnormal Change in Yields

Figure B1: Problem identified

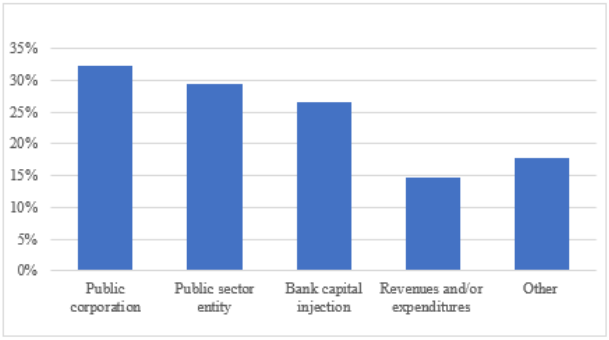


Figure B2: Impact on financial statement

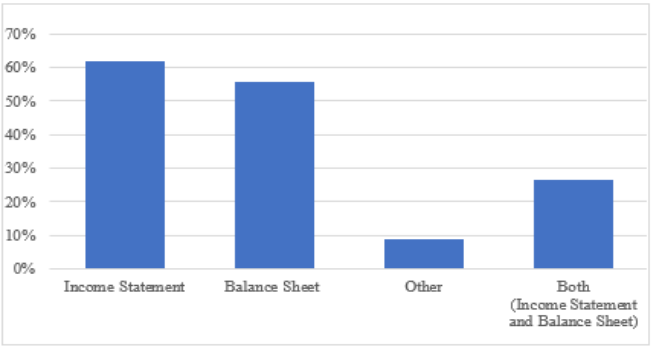
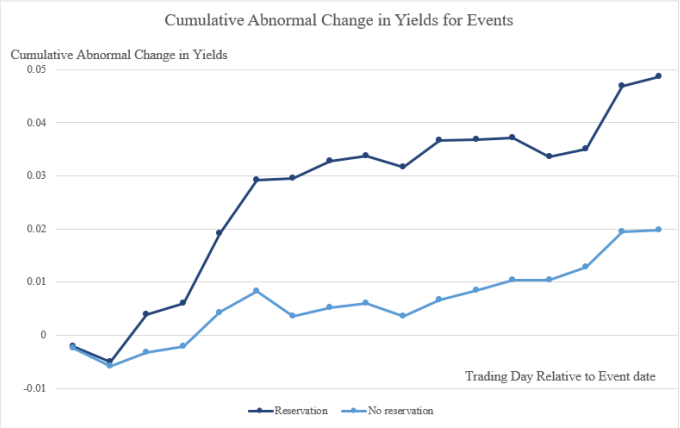


Figure B3: Cumulative Abnormal Change in Yields on a [-1,15] window



Notes. The Appendix provides Reservation examples (Panel A) and statistics (Panel B). In Panel B, Figures B1 and B2 summarize the most common issues raised by Eurostat reservations. Figure B3 plots the cumulative abnormal change in yields on the issuance of Eurostat reservations for the window [-1,15]. We use the 71 reservations in our events sample and compare the cumulative market reaction on the issuance of Eurostat reservations to the cumulative market reaction in absence of a reservation announcement.

Table 1. Sample Selection and Descriptive Statistics

Panel A. Sample Selection

Steps	Sample Selection	No. of Obs.
1	Available semi-annual Eurostat sovereign accounting quality assessments (2004-2018)	811
	Drop benchmark country for abnormal yields calculation (Germany)	30
	Drop observations for which we have no yield at all (Latvia, Estonia)	60
	Drop observations due to missing yield data for all other countries	96
2	Sample for market reaction tests	625
	Drop observations due to missing ownership data	145
3	Sample for ownership tests	480

Panel B. Distribution by Country

Country	No. of Obs.	% of Sample
Austria	4	6
Belgium	9	13
Bulgaria	2	3
Croatia	0	0
Cyprus	2	3
Czechia	0	0
Denmark	2	3
Estonia	0	0
Finland	0	0
France	6	8
Germany	0	0
Greece	12	17
Hungary	6	8
Ireland	1	1
Italy	1	1
Latvia	0	0
Lithuania	0	0
Luxembourg	2	3
Malta	0	0
Netherlands	2	3
Poland	0	0
Portugal	6	9
Romania	2	3
Slovakia	0	0
Slovenia	0	0
Spain	0	0
Sweden	0	0
United Kingdom	14	19
Total	71	100

Panel C. Distribution by Reservation Characteristics

	No. of Obs.	% of Sample
Event Type		
Reservation Expressed	34	48
Reservation Maintained	19	27
Reservation Withdrawn	18	25
Event Relevance		
Deficit or debt	41	58
Not disclosed	30	42
Event Precision		
Quantified	33	46
Non-quantified	38	54
Error Timeliness		
Contemporaneous error	42	59
Past error	29	41
Total	71	100

Notes. This table summarizes the sample selection (Panel A) and the distribution of the reservations across countries (Panel B) and reservation characteristics (Panel C). We classify the events by event type (expressed, maintained, or withdrawn reservations), event relevance (either impact on deficit or debt, or not disclosed), event precision (quantified effect of the reservation or non-quantified one), and error timeliness (contemporaneous or past errors).

Table 2. Market Reaction Test

Panel A. Main Market Reaction Test

VARIABLES	Cumulative Abnormal Change in Yield			
	[0/+1]	[-1/+1]	[0/+1]	[-1/+1]
	(1)	(2)	(3)	(4)
Reservation (t)	0.0100**	0.0068*		
	(2.36)	(1.76)		
Reservation expressed (t)			0.0136***	0.0185***
			(4.50)	(5.01)
Reservation maintained (t)			0.0061	-0.0055
			(1.02)	(-1.24)
Reservation withdrawn (t)			0.0069	-0.0040
			(0.68)	(-0.62)
SFA (t)	-0.0001	0.0003	-0.0001	0.0003
	(-0.11)	(0.27)	(-0.12)	(0.26)
Constant	-0.0012**	-0.0033***	-0.0012**	-0.0033***
	(-2.65)	(-7.57)	(-2.70)	(-7.65)
Observations	625	625	625	625
R-squared	0.022	0.024	0.023	0.029
Country FE	Yes	Yes	Yes	Yes

Panel B. Market Reaction Test on Reservation Characteristics

VARIABLES	Cumulative Abnormal Change in Yield [-1/+1]			
	(1)	(2)	(3)	(4)
Reservation	0.0068*			
	(1.76)			
Event Relevance				
Deficit or Debt		0.0114**		
		(2.39)		
Not disclosed		0.0006		
		(0.11)		
Event Precision				
Quantified			0.0150***	
			(2.83)	
Non-quantified			-0.0001	
			(-0.02)	
Error Timeliness				
Contemporaneous error				0.0132***
				(2.80)
Past error				-0.0025
				(-0.50)
SFA	0.0003	0.0003	0.0003	0.0003

	(0.27)	(0.30)	(0.27)	(0.26)
Constant	-0.0033***	-0.0034***	-0.0034***	-0.0033***
	(-7.57)	(-7.58)	(-7.68)	(-8.29)
Observations	625	625	625	625
R-squared	0.024	0.025	0.026	0.026
Country FE	Yes	Yes	Yes	Yes
p-value for F-test on:		Deficit or Debt = Not disclosed	Quantified = Non-quantified	Contemporaneous error = Past error
		0.078	0.056	0.021

Notes. This table reports the coefficient estimates and t-statistics from ordinary least squares (OLS) regressions of cumulative abnormal change in yields (CAchgY) on *Reservation* (Panel A) and on Reservation Characteristics (Panel B). The reservation sample is partitioned by event relevance, event precision, and error timeliness as defined in Table 1, Panel C. The dependent variable is the cumulative abnormal change in yield (CAchgY) over the [0/+1] event window. The estimation window is [-60/-30] and the sample period is 2004-2018. P-values for the F-test are provided below to test the equality of coefficients of reservations characteristics. Variable definitions are provided in the internet Appendix. T-statistics based on standard errors clustered at country level are displayed in parentheses below the coefficient estimates. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

Table 3. Domestic Sovereign Debt Holdings after Reservations

VARIABLES	Δ Domestic Ownership by GDP			
	From Q-1 to Q+1		From Q-1 to Q+4	
	(1)	(2)	(3)	(4)
Reservation (t)	2.1235**	1.9981*	5.2843***	4.6755**
	(2.26)	(2.04)	(3.40)	(2.85)
SFA (t)		0.0493		0.0126
		(0.47)		(0.05)
Δ Public debt (t)		0.1795		0.7090**
		(1.02)		(2.42)
Δ Public deficit (t)		0.0487		-0.7900**
		(0.54)		(-2.69)
GDP growth (t)		0.3219*		0.3361
		(1.89)		(0.60)
Constant	-0.6951***	-1.5022***	1.9447***	0.5127
	(-6.22)	(-4.68)	(10.53)	(0.47)
Observations	480	480	480	480
R-squared	0.184	0.197	0.391	0.443
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes. This table reports the coefficient estimates and t-statistics from ordinary least squares (OLS) regressions of the variation of domestic sovereign debt holdings after a reservation, scaled by GDP. Columns (1) and (2) investigate the ownership levels the three months after a reservation while columns (3) and (4) look at ownership levels twelve months afterwards. The sample period is 2004-2018. Variable definitions are provided in the internet appendix. T-statistics based on standard errors clustered at country level are displayed in parentheses below the coefficient estimates. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.