

INFORMATION CONTENT AND CONSENSUS EFFECT OF FISCAL PLANS[°]‡

*CONTENIDO DE LA INFORMACIÓN Y EFECTO DE
CONSENSO DE LOS PLANES FISCALES*

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Abstract

This paper investigated the extent to which fiscal plans provide novel information to investors and induce consensus over governments' fiscal forecasts. Based on the mandatory disclosure requirements of the Stability and Growth Pact, we documented that fiscal plans are generally informative, but investors interpret their content differently. We further showed that, while fiscal plans that foresee spending cuts during downturns have substantial information content, they cause opinion divergence. Although these findings are consistent with recent evidence on the contractionary and uncertain effects of procyclical fiscal policy during recessions, they cast doubt on governments' ability to anchor fiscal expectations in these periods.

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JEL classification: E62, C21, G14, G12.

Resumen

Este estudio investiga hasta qué punto los planes fiscales proporcionan información novedosa a los inversores e inducen consenso sobre las previsiones fiscales de los gobiernos. Aprovechamos los requisitos de divulgación obligatoria del Pacto de Estabilidad y Crecimiento y documentamos que, en general, los planes fiscales son informativos, pero los inversores interpretan su contenido de manera diferente. Demostramos además que, aunque los planes fiscales que prevén recortes del gasto durante las recesiones tienen un contenido informativo sustancial, provocan divergencias de opinión. Aunque estos resultados son coherentes con la evidencia reciente sobre los efectos contractivos e inciertos de la política fiscal procíclica durante las recesiones, arrojan dudas sobre la capacidad de los gobiernos para anclar las expectativas fiscales durante las recesiones.

Palabras clave: política fiscal, modelo de efecto de tratamiento, estudios de eventos, rendimientos de acciones, volumen de operaciones.

Clasificación JEL: E62, C21, G14, G12.

INTRODUCTION

This paper investigated whether and how fiscal plans contain information relevant to equity investors and induce consensus about expected fiscal outcomes –which we define as “fiscal guidance”.

Theoretically, fiscal guidance should be an important policy instrument, because fiscal policy is conducted through a mix of announcements and actions (Alesina et al., 2015; Fujiwara & Waki, 2020). Accordingly, the role of fiscal guidance is to communicate fiscal plans before actions are implemented with the twin goal of informing investors and anchoring their expectations around governments’ own forecasts (Alesina et al., 2015; Leeper, 2009; Leeper et al., 2009).

While apparently important, little is known about the actual relevance of fiscal guidance to investors and the extent to which their expectations converge following the launch of fiscal plans. Indeed, prior research has mostly examined investors’ responses to *realized* fiscal shocks using low-frequency data (Afonso & Sousa, 2011; Agnello & Sousa, 2013; Ardagna, 2009; Arin et al., 2009). Based on high-frequency data on the announcement date of fiscal plans and the forecasts contained therein, we provide the first systematic empirical analysis of investors’ immediate response to fiscal guidance to the best of our knowledge. First, we evaluated the average information content and the consensus effect of these plans. As fiscal plans are exposed to implementation uncertainty and fiscal forecasts are characterized by a predictable bias (Alesina & Perotti, 1996; Frankel, 2011), investors may neglect their content or diverge in their interpretation. Second, we used recent studies reporting that fiscal multipliers depend on the sign of fiscal policy, the state of the economy, and the dynamics of revenues and expenditures to explore possible drivers of heterogeneity in the investors’ response (Alesina et al., 2015; Alesina & Ardagna, 2010; Auerbach & Gorodnichenko, 2012, 2013; Blanchard & Perotti, 2002; Jordà & Taylor, 2016; Perotti, 2004; Riera-Crichton et al., 2015).

Specifically, we employed an array of fiscal plans presented by European Union (EU) governments between 2001 and 2018 as a result of mandatory disclosure requirements imposed by the Stability and Growth Pact (SGP). Over the last 20 years, these plans have been published annually on precisely measurable dates, providing four-year fiscal forecasts for up to 28 EU countries. Using these features, Columbano (2022) built an unbalanced panel data set containing both forecasts and publication dates. We verified the accuracy of these forecasts by replicating the main findings of Frankel and Schreger (2013). Then, considering the EU fiscal constraints, we designed a treatment assignment mechanism based on a policy

rule (Angrist et al., 2018). Methodologically, we estimated the contemporaneous response to fiscal plans using local projections (LPs) (Jordà, 2005) that we applied to daily stock market data. In particular, we calculated the conditional probabilities that a fiscal plan foresees a fiscal adjustment and recast them as policy propensity scores. Under the assumption of selection-on-observables, this procedure allowed us to assess the treatment effect of *planned* fiscal adjustments in a short window around the announcement of fiscal plans. Next, we determined impulse response functions (IRFs) through LPs, as in recent studies (Auerbach & Gorodnichenko, 2013; El-Shagi & Schweinitz, 2020; Jordà & Taylor, 2016; Riera-Crichton et al., 2015). Lastly, we tested whether the effect is heterogeneous depending on the sign of fiscal policy, the state of the economy, and the content of the fiscal plan.

Our results provide novel insights. We found that the launch of fiscal plans is associated with abnormal volatility of returns and trading volume. However, the latter highlights the disparity between investors' interpretation of the likely effects of planned fiscal policy. When exploring the mechanism behind these results, we observed that the sign of planned fiscal policy drives the heterogeneity in the treatment effect. Fiscal plans that anticipate a fiscal adjustment are more informative than those that do not. We also documented the state-dependence of this effect. Namely, fiscal adjustments are only informative if planned during downturns, yet they cause investors' opinions to diverge with respect to their probable economic effects. Finally, we showed that the informativeness of fiscal adjustments depends on the content of the fiscal plan. We documented that disclosing a procyclical fiscal adjustment during recessions carries high information content, but investors diverge in its interpretation. This finding suggests that they may disagree on the probability that governments implement the promised spending cuts in these periods (Alesina et al., 1998; Ziogas & Panagiotidis, 2021).

Overall, this study contributes to the literature on the association between financial markets and fiscal policy in several ways. First, although fiscal plans are an integral element of modern fiscal policy development and fiscal forecasts are presumed to be key inputs in the decision-making process of economic agents, our article is the first to examine both the use and the interpretation of fiscal plans in financial markets. Our study corroborates earlier findings that equity investors are heedful of fiscal announcements and are not Ricardian (Foresti & Napolitano, 2017; Tavares & Valkanov, 2003), but our focus on fiscal plans points to an intrinsic value of fiscal forecasts that more than offsets their known optimistic bias (Frankel & Schreger, 2013; Strauch et al., 2004). In addition, our investigation emphasizes that investors have a conflicting interpretation of the implications of fiscal plans (Kandel & Pearson, 1995; Kandel & Zilberfarb, 1999). To our knowledge, we are the first

to document the limits of fiscal guidance as a tool to anchor fiscal expectations. As this is the primary objective of fiscal guidance (Fujiwara & Waki, 2020; Leeper, 2009), this study contributes to understating the extent to which governments are able to create consensus in markets.

Second, our identification strategy addressed several limitations recognized in prior studies. In particular, our use of market outcomes evaluated at a daily frequency significantly reduced the measurement error induced by the uncertain timing of policy announcements in low-frequency data (Ardagna, 2009). This procedure also mitigated concerns that fiscal policy may be introduced in response to asset returns or monetary policy (Agnello et al., 2012; Agnello & Sousa, 2013; Chatziantoniou et al., 2013). Besides, our treatment effect approach based on the first-stage estimation of policy propensity scores represents a promising solution for identifying exogenous fiscal shocks in the presence of both fiscal rules and known biases in fiscal forecasts (Frankel, 2011; Frankel & Schreger, 2013). This strategy may be of interest to researchers estimating fiscal policy impacts in settings characterized by fiscal rules (Caselli & Wingender, 2018).

The remainder of this paper is structured as follows. Section I reviews the relevant literature. The research design is explained in Section II. Section III presents the data, and Section IV provides the results. Finally, in the last section the conclusion is presented. The *Supplementary Material* contains additional analyses and extensive tests of alternative treatment measures.

I. LITERATURE REVIEW

I.1. The transmission of fiscal policy in stock markets

Prior studies on the transmission of fiscal policy in stock markets examined whether investors react favorably to news about fiscal adjustments/deteriorations. Accordingly, they tested the impact of changes in the primary fiscal balance on stock returns. These investigations generally found that stock returns respond positively (negatively) to fiscal adjustments (deteriorations). For example, Darrat (1988, 1990) analyzed monthly and quarterly Canadian stock returns and documented a negative response to lagged fiscal deteriorations. Employing annual data on Organization for Economic Co-operation and Development (OECD) countries, Ardagna (2009) showed that fiscal adjustments are followed by an increase in stock returns, mainly when these include spending cuts, and the government faces fiscal distress. The author inferred that equity investors welcome fiscal adjustments. Cor-

respondingly, Tavares and Valkanov (2003) reported that a rise in the tax burden of the United States is followed by negative stock returns, while changes in spending have non-significant effects. The researchers suggested that these results are driven by the comparatively high persistence of tax rates.

For their part, Arin et al. (2009) analyzed quarterly series of labor, indirect, and corporate taxes in the United States, Japan, and Germany and showed that the tax instrument drives stock returns. Specifically, increases in labor and indirect taxes reduce stock returns, while a corporate tax hike has a null effect. The authors attributed their findings to the ability of firms to shift between equity and debt financing. Likewise, Agnello and Sousa (2013) used quarterly series and evidenced that stock returns decline following a fiscal deterioration in a sample of 10 industrial economies, consistent with neoclassical crowding-out effects (see Afonso & Sousa, 2011). Moreover, Foresti and Napolitano (2017) examined quarterly data from 11 eurozone countries and observed that stock returns respond positively to fiscal adjustments during normal macroeconomic conditions and negatively during financial crises. The authors concluded that financial markets welcome expansionary fiscal policies in periods of uncertainty. Finally, two studies considered the long-run association between fiscal policy and stock returns in the United States. On the one hand, El Montasser et al. (2020) found that, while stock returns decline in the first year after an episode of fiscal deterioration, they increase over the remaining eight years. On the other, Marfatia et al. (2020) identified that fiscal adjustments are typically followed by positive stock returns, particularly since the 1980s (see also Mumtaz & Theodoridis, 2020).

I.2. Fiscal policy and the economy

The literature on the economic effect of fiscal policy is relevant, because a stock market interest in fiscal announcements occurs if fiscal policies affect aggregate demand, which impacts firms' cash flows (Tavares & Valkanov, 2003). Numerous studies have tried to determine whether fiscal policy stimulates or hinders aggregate demand by estimating the fiscal multiplier (the change in output attributable to a change in the fiscal balance) (Alesina & Ardagna, 2010; Blanchard & Perotti, 2002; Ramey, 2011). Yet, previous findings are contradictory in terms of both the sign and magnitude of fiscal multipliers, suggesting that these are not a constant parameter (Riera-Crichton et al., 2015). Instead, recent investigations showed that multipliers are contingent on pre-existing conditions, such as business cycles, levels of fiscal stress, and the content of fiscal shocks. For example, Auerbach and Gorodnichenko (2012, 2013) used quarterly US time series and semian-

nual OECD data and found that fiscal multipliers are positive during recessions and null during expansions. In addition, Jordà and Taylor (2016) analyzed fiscal adjustments in OECD countries and reached similar conclusions. While El-Shagi and Schweinitz (2020) did not identify that fiscal multipliers are dependent on the state of the economy, they noted that fiscal adjustments are not contractionary if they occur during periods of fiscal stress. In turn, Alesina et al. (2015) showed that, in comparison to revenue-based fiscal adjustments, those related to spending have a lower contractionary effect on GDP growth, ascribing this finding to a positive reaction of real investment to spending-based adjustments (El-Shagi & Schweinitz, 2020). Moreover, Ziogas and Panagiotis (2021) attributed the nearly positive effect of spending-based fiscal adjustments to their relative persistence compared to those concerning revenue.

Riera-Crichton et al. (2015) re-examined this question, documenting that the typical estimate of a null or small spending-based fiscal multiplier of 0.4 (Albonico et al., 2016; Attinasi & Metelli, 2017; Perotti, 2004) represents the average of a null spending multiplier during economic growth and a large, positive one during recessions. As government spending is often procyclical in times of recessions, their evidence suggests that the impulse response to fiscal adjustment should be evaluated conditional on both the state of the economy and the sign of fiscal policy.

We focused on these insights to examine the informativeness of fiscal plans from equity investors' perspective, using the uncertainty of estimated effects to investigate if investors' expectations converge following the announcement of planned fiscal adjustments. Our analysis of the degree of this convergence tested under which conditions fiscal plans anchor investors' beliefs around the government's privately observed signal (Leeper, 2009; Lundtofte & Leoni, 2014). We deemed this perspective vital, because a restrictive assumption of the prior literature is that investors interpret fiscal announcements uniformly. Given both the mixed results in the literature and related studies on opinion divergence following economic announcements (Kandel & Pearson, 1995; Kandel & Zilberfarb, 1999), we expected investors to have different background information on the likely effect of fiscal policy on output. Namely, and following Foresti and Napolitano (2017), while some investors may adopt a Keynesian perspective and consider planned fiscal adjustments as positive for aggregate demand and firms' future cash flows, others may agree with a Neoclassical standpoint to focus on the distortionary effect of fiscal policy. Furthermore, certain investors may take a Ricardian position and neglect fiscal announcements (Albonico et al., 2016; Tavares & Valkanov, 2003). Through our tests, we were able to (i) document the conditions rendering fiscal plans informative, (ii) assess whether planned fiscal adjustments are more informa-

tive than deteriorations, (iii) distinguish if these relations vary depending on the state of the economy and the content of the fiscal plan, and (iv) evaluate whether investors homogenously interpret planned fiscal adjustments.

II. RESEARCH DESIGN

II.1. Event study

Similar to the recent work of Anderson and Cesa-Bianchi (2020), our empirical strategy consists of two steps. We first conducted an event study that measured abnormal volatility of returns and trading volume following the launch of fiscal plans. Next, we assessed the market effect of fiscal adjustments through LPs. Unlike Anderson and Cesa-Bianchi (2020), we estimated the IRF on daily rather than monthly data, and we used propensity scores to detect the counterfactual effect.

In the event study stage, we analyzed the information content and consensus effect of fiscal plans through a standard event study of abnormal volatility of returns and trading volume (Cabrera et al., 2016; Kothari & Warner, 2007). In particular, abnormal volatility of returns captured the information content of fiscal guidance, regardless of whether it carries good or bad news (Holthausen & Verrecchia, 1990). Next, post-guidance trading volume measured the extent to which investors disagree in assessing how the planned path for fiscal policy relates to future cash flows (Kandel & Pearson, 1995). Then, trading takes place even in the absence of price changes due to the divergent interpretations of fiscal announcements. For example, two investors may have different background information about the impact of fiscal policy on firm earnings. Following the announcement of fiscal guidance, the difference in beliefs causes trading to occur even if stock prices do not change (Campbell et al., 1997; Holthausen & Verrecchia, 1990; Kandel & Pearson, 1995; Kandel & Zilberfarb, 1999). We operationalized the information content and trading volume as abnormal volatility of returns (*ABVAR*) and abnormal trading volume (*ABT*) on event days, which were computed from firm-level data. To calculate *ABVAR*, we followed Landsman and Maydew (2002) and obtained abnormal returns as the prediction error of a one-factor market model wherein firm-level daily returns were regressed on equal-weighted average daily stock returns of all firms in a country. Defining with $r_{i,c,d}$ the return of firm i in country c on day d , the market model was estimated on trading days $d - 100$ to $d - 11$ as $r_{i,c,d} = \alpha_{i,c} + \beta_{1i,c} * r_c + e_{i,c,d}$. The abnormal return of firm i is the prediction error of this regression in an event window that includes days $d - 10$ to $d + 10$, i.e., $AR_{i,c,d} = r_{i,c,d} - (\hat{\alpha}_{i,c} + \hat{\beta}_{1i,c} * r_c)$. *ABVAR* is the

variance of abnormal returns during the event window, divided by its variance in the estimation period.

$$ABVAR_{icd} = \frac{AR_{icd}^2}{S_{ic}^2} \quad (1)$$

With S_{ic}^2 being the variance of returns in the estimation period. In the sample, $ABVAR$ was standardized to have a mean of 0 rather than 1. To measure abnormal turnover (ABT), we adopted the methodology of Chae (2005), calculating ABT as the difference between the proportion of shares traded on the event day and the estimation window average. We controlled for event-day liquidity trading, which is a potential driver of trading volume uncorrelated with information-driven trading, by eliminating the average trading volume in the estimation period. Representing the volume of shares of firm i in country c traded on day d as V_{icd} , the total number of firms' shares on that day as Sh_{icd} , and the number of days in the estimation period as D , ABT is:

$$ABT_{i,c,d} = \ln\left(\frac{V_{i,c,d}}{Sh_{i,c,d}}\right) - \frac{1}{D} \sum_{d=-11}^{-D} \left[\ln\left(\frac{V_{i,c,d}}{Sh_{i,c,d}}\right)\right] \quad (2)$$

The arithmetic sums of $ABVAR$ and ABT over the event days are expressed as cumulative volatility of returns ($CABVAR$) and cumulative abnormal turnover ($CABT$). As illustrated in the subscripts, the unit of analysis is the firm-day, and, on the event date, multiple firms were nested within the same country-day announcement. As the outcome variables were calculated at the firm-day level, but the treatment took place at the country-day level, we assessed the statistical significance of $ABVAR$ and ABT through an intercept-only ordinary least squares (OLS) regression in which we clustered standard errors two-ways on the country- and event-day dimensions (Abadie et al., 2017).

II.2. Identification strategy

A treatment that reflects the construct of fiscal adjustments can be operationalized in several ways, such as by examining fiscal adjustments that are short- or long-term, frontloaded or backloaded, large or small (Alesina & Perotti, 1996). Non-narrative approaches typically compute a change in the government's fiscal stance over a specific horizon and use Vector Auto-Regression (VAR)-based techniques to estimate the fiscal multiplier (Alesina et al., 2002). We adopted this approach and applied it to medium-term fiscal forecasts to determine if a fiscal plan foresees a fiscal adjustment or a deterioration. Specifically, the treatment was

operationalized as a country day wherein the government announces that the annual primary balance will consistently improve over the horizon that separates the disclosure at year t and $t + 21$. In particular:

$$\left\{ \begin{array}{l} PFA_{c,d} = 1 \text{ if } FPBI_{c,d}^t > 0, FPBI_{c,d}^{t+1} > 0, FPBI_{c,d}^{t+2} > 0 \\ PFA_{c,d} = 0 \text{ otherwise} \end{array} \right\} \quad (3)$$

where PFA refers to “Planned Fiscal Adjustment” and $FPBI$ stands for “Forecasted Primary Balance Improvement”. We constructed $FPBI$ as the difference between the forecasted primary balance at year $t + h$ and the lagged budget balance at $t - 1$ (Frankel & Schreger, 2013). We concentrated on the primary balance, because it excludes interest expenditures not directly under government control (Ziogas & Panagiotidis, 2021). Thus, in our analysis, country-days were treated when the primary balance was set to improve in each of the next three years.

This identification strategy presents a challenge, because $PFA_{c,d}$ is unlikely to be randomly assigned to governments in our sample. Indeed, given that $PFA_{c,d}$ is an announcement of planned fiscal adjustment, it is likely to be endogenous to economic, fiscal, and political conditions. To address endogeneity concerns, we designed a treatment assignment mechanism consistent with Caselli and Wingender’s (2018) approach, which applies the presence of EU fiscal rules to determine the probability that a fiscal plan contains a planned fiscal adjustment. Existing research suggests that governments with weak fiscal performance are more likely to announce future improvements in the fiscal balance (Frankel, 2011; Frankel & Schreger, 2013). Besides, the governments in our sample are constrained by EU fiscal rules, dictating specific limits on their deficits. This situation implies that governments not abiding by fiscal rules at the time of the launch are more likely to announce future compliance over the medium-term horizon. Likewise, Frankel and Schreger (2013) confirmed that this is the case, and we replicated their results in Appendix A of the *Supplementary Material*. Following the literature on policy propensity scores (Angrist et al., 2018; Angrist & Kuersteiner, 2011), we recast these incentives as a policy rule that describes the probability of a country-date being assigned to the treatment condition. Specifically, we posited that whether or not a country announces a fiscal adjustment in its fiscal plan launched on day d (*i. e.*, $PFA_{c,d} = 1$) depends on a policy rule represented by $PFA_{c,d} = PFA(X_{c,t}, \mathbf{B}, \epsilon)$. Our identification assumption is that $PFA(X_{c,t}, \mathbf{B}, \epsilon)$ is observable and estimable using a policy propensity score. To calculate these

¹ We examined fiscal plans that also contain forecasts for year $t+3$. Still, some fiscal plans due for publication in year t were published in year $t+1$. Consequently, for some event dates, the government’s forecast for year $t+3$ is not available. Thus, we prioritized horizon $t+2$ to guarantee a consistent number of observations in our tests.

scores, we implemented a probit model that assesses $\Pr(PFA_{c,d} = j | X_{c,t}) = p_j(X_{c,t}, \mathbf{B})$ for treated ($j = 1$) and untreated ($j = 0$) observations. The probit model proposes the following treatment assignment mechanism:

$$\begin{aligned} \mathbf{1}\{PFA_{c,d}\} = & \beta_1 Debt_{c,t-1} + \beta_2 Budget\ Balance_{c,t-1} + \\ & \beta_3 Yields_{c,d-11} + \beta_4 Recession_{c,t-1} + \\ & \beta_5 Fiscal\ Volatility_{c,t-1} + \beta_6 Output\ Volatility_{c,t-1} + \\ & \beta_7 EU\ Funds_{c,t-1} + \beta_8 Stock\ Market\ Exposure_{c,t-1} + \\ & \beta_9 Euro\ adopter_{c,t-1} + \beta_{10} Government\ Strength_{c,t} + \\ & \beta_{11} Fragmentation\ of\ Parliament_{c,t} + \\ & \beta_{12} Electoral\ Pressure_{c,t} + \beta_{13} PFA_{c,t-1} + \varrho_{c,d} \end{aligned} \quad (4)$$

Appendix B describes the rationale for variable selection. Predicted coefficients of the probit model and estimated coefficients are presented in Tables B.1 and B.2 of the *Supplementary Material*, respectively, along with estimates of the probit model under alternative definitions of treatment. The diagnostics of the model are provided in Appendix B (*i. e.*, Figures B.1. and B.2), together with the validation of the identification assumption. Our findings indicate that both fiscal and economic conditions are largely responsible for governments' decisions to plan fiscal adjustments. Consistent with both prior literature and the data given by the functioning of fiscal rules, governments with weak fiscal performance are significantly more likely to announce a planned fiscal adjustment. During recession periods, governments are also more likely to implement a fiscal adjustment, confirming the procyclical-ity of fiscal policy in the EU (Larch et al., 2021). In line with prior literature, we observed that fiscal adjustments are relatively persistent (Frankel, 2011; Frankel & Schreger, 2013; Jordà & Taylor, 2016).

Overall, the evidence confirms that the probability of announcing a fiscal adjustment depends on an observable policy rule, thus validating the propensity score approach.

II.3. Treatment effect

Given that the treatment is predictable based on a policy rule, we re-randomized the sample through inverse probability weights (IPWs) to condition our estimated treatment effect on the empirical propensity score (Rosenbaum & Rubin, 1983). Thus, treatment effects were identified from treated (untreated) observations with relatively low (high) propensity scores. Since the IPW method is sensitive to extreme scores, we adopted the augmented inverse probability weights (AIPW) estimator (Glynn & Quinn, 2009), which is robust to misspecification of either the

outcome or propensity score model (Jordà & Taylor, 2016; Robins et al., 1994). Next, we followed recent literature to assess the treatment effect of planned fiscal adjustments (e.g., El-Shagi & Schweinitz, 2020; Riera-Crichton et al., 2015) and estimate IRFs through LPs (Jordà, 2005). Emulating the setup in Jordà and Taylor (2016), we recast our cumulative market outcomes, $CABVAR$ and $CABT$, from the event day onwards as the cumulative firm-level impulse response to the country-specific announcement of a fiscal adjustment denoted by $PFA_{c,d}$. This announcement occurs on the event-date d and propagates up to horizon h (i. e., $Y_{i,d+h} - Y_{i,d}$). We computed the treatment effects with a maximum horizon of three days starting with the event day d to account for possible measurement errors in the day of publication of fiscal plans. Then, the baseline LP can be written as:

$$Y_{i,c,d+h} - Y_{i,c,d} = \alpha_c + \lambda_t + \beta_1 PFA_{c,d} + \mathbf{B}X_{c,t} + \mathbf{\Gamma}Z_{c,d} + v_{i,c,d+h} \quad (5)$$

where α_c and λ_t are the country and year fixed effects, respectively. Vector $X_{c,t}$ contains control variables, including the first lag of $PFA_{c,d}$ and vector $Z_{c,d}$ controls for contemporaneous market conditions sampled at the daily frequency. Finally, $v_{i,c,d+h}$ is the error term. Thus, Equation (5) projects the fiscal announcement $PFA_{c,d}$ on market outcomes. In line with Jordà and Taylor (2016), we implemented two separate LPs for $PFA_{c,d} = 1$ and $PFA_{c,d} = 0$, rather than estimating β_1 directly through OLS, and computed the treatment effects as $\mathbb{E}(Y_{i,d+h} - Y_{i,d} | PFA_{c,d} = j)$, with $j \in (0, 1)$:

$$Y_{i,c,d+h} - Y_{i,c,d} = \alpha_c + \lambda_t + \beta_1 CABVAR_{i,c,d} + \beta_2 Spread_{i,c,d} + \beta_3 Change\ in\ Yields_{c,d} + \beta_4 Fiscal\ Revision_{c,d} + \beta_5 Growth\ Revision_{c,d} + \mathbf{X}_{c,d}\mathbf{\Lambda} + \zeta_{i,c,d+h}, \quad (6)$$

where the terms $Y_{i,c,d+h} - Y_{i,c,d}$ are either $CABVAR$ or $CABT$, \mathbf{X} is the vector of variables included in the probit model, and α_c and λ_t are country and year fixed effects, respectively. As the yield level on 5-year benchmark government bonds, one day before the beginning of the event window ($Yields_{c,d-11}$) was added in vector \mathbf{X} , we effectively controlled for any information that precedes the launch of fiscal plans that is priced by investors if relevant. Accordingly, controlling for $Yields$ allowed us to circumvent the known problem of measuring investors' expectations derived, for instance, from previously issued fiscal forecasts. In addition, the variable captures all remaining observable confounders that (i) affect the probability of announcing a fiscal adjustment; (ii) are priced by bond market investors, and (iii) take place between the measurement day of the fiscal, economic and political variables and the event day. This control strongly alleviated identification concerns, given that it preceded treatment while being measured close to it. To further

strengthen identification, country-level variables directly drawn from the fiscal plan launched on event day d were incorporated, which were thus perfectly aligned with the measurement frequency of the treatment variable. Namely, we controlled for the revision of the forecasted fiscal adjustment between the focal fiscal plan and the previous one. This variable is denoted by *Forecast Revision* $_{c,d}$ and accounts for the possibility that forecast revisions affect market reactions. Likewise, we controlled for the forecasted change in the GDP growth rate, because governments report fiscal adjustments as a percentage of GDP; thus, they are mechanically affected by the forecasted revision of the growth rate (Frankel & Schreger, 2013). We indicated this as *Growth Revision* $_{c,d}$. These variables were measured with reference to the end of the forecast horizon of fiscal adjustments (*i. e.*, $t + 2$), and the capital market conditions on event day d were also included. We also controlled for the contemporaneous change in *Yield* $_{c,d}$, represented as *Change in Yields* $_{c,d}$ and computed as the natural logarithm of the ratio $\frac{Yield_{c,d}}{Yield_{c,d-1}}$. This variable expresses the contemporaneous bond market reaction to fiscal forecasts that may affect stock markets due to portfolio reallocation (Laubach, 2009; Wachtel & Young, 1987). The volatility of returns on the event day (*i. e.*, *ABVAR* $_{i,c,d}$) and the bid-ask spread (*i. e.*, *Spread* $_{i,c,d}$) were added to control for the impact of information content and asymmetry on trading decisions ahead of prescheduled announcements (Chae, 2005; Savor & Wilson, 2013).² As the impulse responses $Y_{i,c,d+h} - Y_{i,c,d}$ were calculated at the firm-day level, but the treatment was at the country-day level, we clustered the standard errors two-ways at the country-day dimension (Abadie et al., 2017). We separately implemented LPS for expansionary and recessionary periods and for country-years wherein forecasts indicated that revenues or expenditures would increase between t and $t + 2$, to explore heterogeneity in the treatment effect of $PFA_{c,d}$.

III. Data

Data on the fiscal forecasts for the treatment measure and the event dates of the Stability/Convergence Programmes (SCPs) launched by EU countries over the period 2001-2018 are described in Columbano (2022). As to the quality of the forecasts contained in the data set of SCPs, we validated them by replicating the main findings of Frankel and Schreger (2013) in Appendix A. Firm-level data for measures of abnormal volatility of returns and trading volume were collected from Compus-

² Since Compustat Global does not provide bid-ask prices, the calculation of the daily bid-ask spread followed the procedure outlined in Corwin and Schultz (2012), which used high and low daily stock prices to estimate bid-ask quotes. We thank Shane Corwin for helpful discussions on the construction of this measure.

tat Global-Security Daily files through Wharton Research Data Services (WRDS). Specifics on the filtering procedure for these files are provided in Appendix C, and the summary statistics for all variables are exhibited in Table D.1 of Appendix D. All Appendixes can be found in the *Supplementary Material*. The definitions, methods of construction, and sources of all variables are available in the Appendix.

IV. RESULTS

IV.1. Event study

Panel A of Table 1 and Figure 1 collectively report the results of the event study. The analysis indicates that the highest level of volatility of returns characterizes the launch dates of fiscal plans and trading volume, at 1.2 and 9 percentage points above expectations, respectively. Mainly, the remaining days of the event window feature a level of volatility of returns statistically equivalent to zero, except for days $d - 9$ and $d - 6$ which are marginally significant and negative. Trading volume is also abnormally high on all days preceding the event and remains positive and slightly significant until $d + 3$, after which it returns to normal levels.

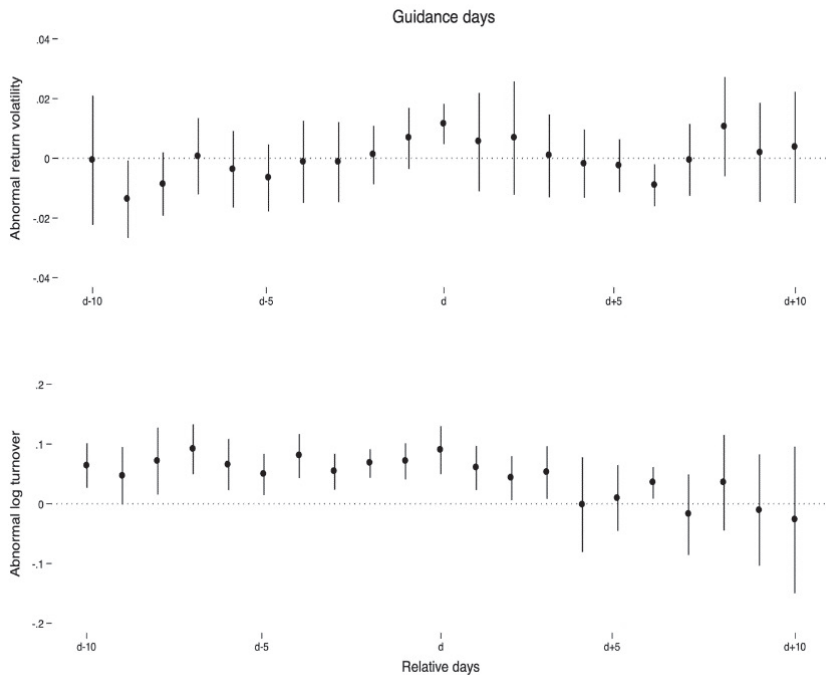
We conducted two robustness tests. As per previous research (e.g., Ricci, 2015), the definition of event date was adjusted to include different sets of days around event day d to account for possible measurement errors. Each row denotes the length of the event window in Panel B. The results confirm that $CABVAR$ is statistically significant only on the event day, while $CABT$ is statistically significant and positive on all days around the event window. Therefore, fiscal plans appear to drive information content only during launch dates. In addition, before, during, as well as immediately after the event, trading activity is abnormally high.

We performed a placebo test in line with Chae (2005) to demonstrate the unbiasedness of the capital market measures in the sample. Placebo values of abnormal volatility of returns and turnover were estimated on a sample of 100 randomly selected days that exclude real launch dates. Since these dates were randomly chosen, the placebo estimates of cumulative volatility of returns and turnover should be statistically indistinguishable from zero. Notably, Panel B of Figure 1 displays the outcomes of the placebo test. The volatility of returns and turnover were cumulated between the first and the last day of the event window (i. e., $d - 10$ to $d + 10$). The top charts report cumulative values on real disclosure days, and the bottom panels show the results on randomly selected dates.

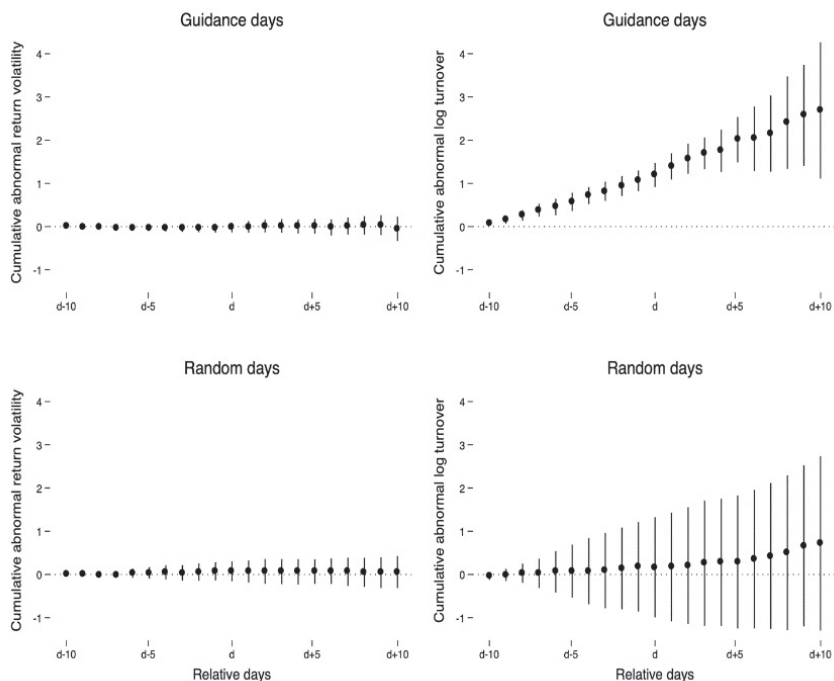
Collectively, the figures indicate that the estimates do not capture measurement bias or random noise in either *CABVAR* or *CABT*.

Figure 1. Event study: Volatility of returns and trading volume around the launch of fiscal plans

Panel A. Daily values on real launch dates



Panel B. Cumulative values on real and placebo dates



Panel A plots the daily abnormal volatility of returns (σ) and abnormal daily turnover (in logarithms) ($\log \tau$) in the 21 trading days around the implementation of a Stability and Convergence Programme (SCP), denoted by d . Panel B shows the cumulative abnormal volatility of returns. In the top charts, we used the real dates of the implementation of SCPs. In the bottom charts, a random sample of 100 dates was applied as a placebo test. Point estimates are the coefficients on an intercept-only OLS regression with standard errors clustered two-ways at the country-disclosure date level. Bars represent the 90 percent confidence intervals. The variables are listed in the Appendix.

Table 1. Event study: Volatility of returns and trading volume around the release of fiscal plans

Panel A. Daily value

Days to event	<i>ABVAR</i>			<i>ABT</i>		
	Beta	s.e.	N	Beta	s.e.	N
-10	-0.001	[0.013]	44834	0.064**	[0.023]	44568
-9	-0.014 ⁺	[0.008]	43646	0.047	[0.029]	43389
-8	-0.009	[0.006]	43004	0.071*	[0.034]	42755
-7	0.001	[0.008]	44716	0.091***	[0.025]	44470
-6	-0.004	[0.008]	46102	0.066*	[0.026]	45844
-5	-0.007	[0.007]	45344	0.049*	[0.021]	45144
-4	-0.001	[0.008]	45250	0.080***	[0.022]	45013
-3	-0.001	[0.008]	45235	0.054**	[0.018]	44992
-2	0.001	[0.006]	45631	0.067***	[0.014]	45405
-1	0.007	[0.006]	46565	0.071***	[0.018]	46314
0	0.012**	[0.004]	46888	0.090***	[0.024]	46651
1	0.005	[0.010]	43165	0.060**	[0.023]	42870
2	0.007	[0.012]	41257	0.043 ⁺	[0.022]	40985
3	0.001	[0.008]	43322	0.052 ⁺	[0.027]	43062
4	-0.002	[0.007]	45594	-0.001	[0.048]	45334
5	-0.002	[0.005]	42789	0.010	[0.033]	42497
6	-0.009*	[0.004]	42321	0.035*	[0.016]	42078
7	-0.001	[0.007]	41693	-0.018	[0.041]	41434
8	0.011	[0.010]	42682	0.035	[0.049]	42425
9	0.002	[0.010]	43999	-0.011	[0.057]	43742
10	0.004	[0.011]	43295	-0.027	[0.075]	42980

Panel B. Cumulative values

Event window	CABVAR			CABT		
	Beta	s.e.	N	Beta	s.e.	N
d	0.012**	[0.004]	46888	0.090***	[0.024]	46651
[d-1,d+1]	0.024	[0.018]	42328	0.270***	[0.054]	41650
[d-2,d+2]	0.039	[0.034]	37917	0.516***	[0.080]	36961
[d-3,d+3]	0.035	[0.046]	35658	0.747***	[0.099]	34475
[d-3,d+1]	0.030	[0.026]	40789	0.454***	[0.076]	39787
[d-2,d+1]	0.028	[0.021]	41144	0.370***	[0.065]	40301
[d-1,d+2]	0.035	[0.030]	39100	0.396***	[0.063]	38291
[d-1,d+3]	0.037	[0.039]	37196	0.511***	[0.074]	36272

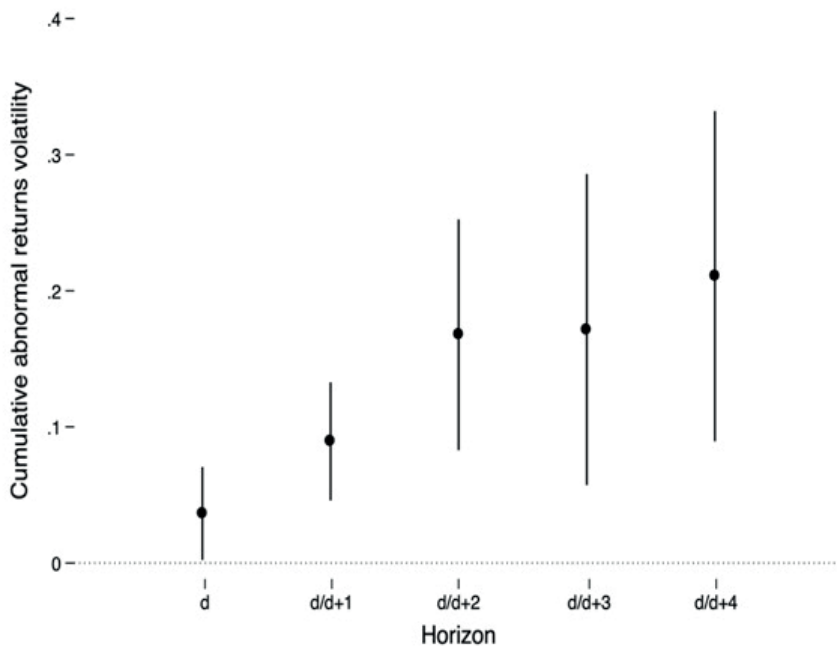
This table (Panel A) reports the daily abnormal volatility of returns (σ) and the daily abnormal trading volume (τ) in the 21 days around the event day t , on which a government implemented a Stability and Convergence Programme (SCP). Panel B provides the abnormal volatility of returns (σ) and abnormal trading volume (τ) cumulated over the days indicated in the event window (Panel B). Standard errors clustered two-ways at the country and disclosure date levels are shown in brackets. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The variables are listed in the Appendix.

IV.2. The treatment effect of planned fiscal adjustments

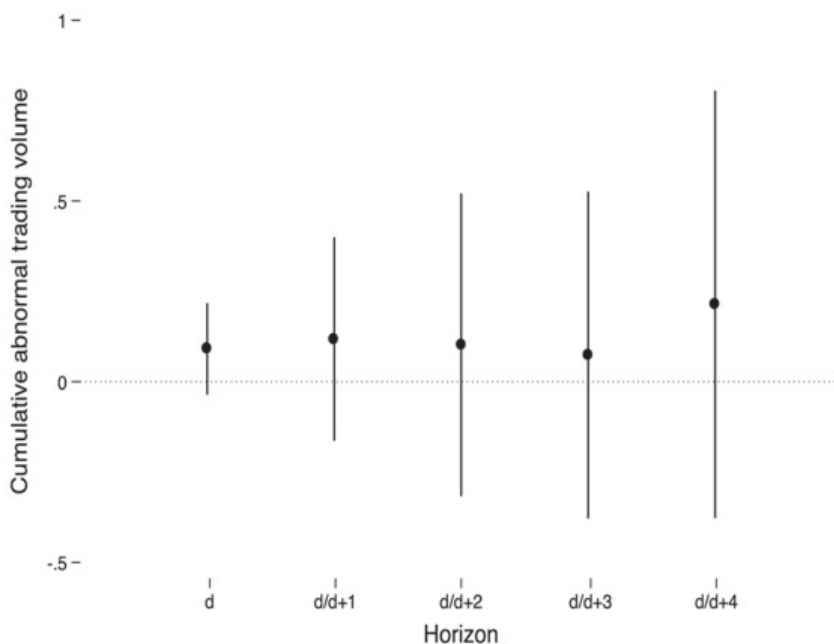
Panel A of Table 2 reports the results of the baseline model testing for the treatment effect of planned fiscal adjustments on abnormal volatility of returns and trading volume. Panel A shows the average treatment effect (ATE) as local projections for governments shifting from the untreated condition to the treated one. Panel B evidences the same analysis, but considers the cumulative values. Figure 2 illustrates the coefficients and standard errors over the cumulation period.

Figure 2. Average treatment effect of planning a fiscal adjustment: Local projections

Panel A. Cumulative abnormal volatility of returns



Panel B. Cumulative abnormal trading volume



This figure displays the average treatment effect (ATE) of δ on the cumulative abnormal volatility of returns (Panel A) and cumulative abnormal trading volume (Panel B). The ATE was estimated through local projections. δ is equal to 1 when governments announce that the primary balance will improve every year between t and $t+1$. The outcome model was omitted for presentation purposes. Confidence intervals calculated based on standard errors clustered two-ways at the country-disclosure date level are reported as segments. The variables are listed in the Appendix.

Table 2. Average treatment effect of planning a fiscal adjustment:

Panel A. Local projections			
	(1)	(2)	(3)
	[d]	[d/d+1]	[d/d+2]
<i>CABVAR</i>	0.057*	0.063	0.078
	[0.027]	[0.041]	[0.091]
N	21128	21128	21128
Panel B. Local projections during economic expansions and downturns			
	(1)	(2)	(3)
	[d]	[d/d+1]	[d/d+2]
<i>CABT</i>	0.091	0.118	0.102
	[0.077]	[0.171]	[0.255]
N	21128	21128	21128
Panel B. Local projections during economic expansions and downturns			
<i>CABV</i>	[d]	[d/d+1]	[d/d+2]
<i>Expansions</i>	-5.05	-7.76	-6.92
	(4.51)	(6.48)	(6.50)
<i>Downturns</i>	0.84**	0.88+	2.21**
	(0.26)	(0.51)	(0.84)
N	21128	21128	21128
<i>CABT</i>	[d]	[d/d+1]	[d/d+2]
<i>Expansions</i>	-17.13	-21.88	-6.06
	(15.77)	(19.48)	(6.51)
<i>Downturns</i>	2.83*	2.63+	1.84+
	(1.12)	(1.43)	(0.97)
N	21128	21128	21128

Panel C. Local projections based on the composition of the fiscal plan during downturns

<i>CABVAR</i>	[d]	[d/d+1]	[d/d+2]
<i>Revenue increase</i>	-0.80*	-1.52*	-2.93**
	(0.35)	(0.67)	(1.05)
<i>Expenditure decrease</i>	0.55*	1.25*	2.20*
	(0.25)	(0.52)	(0.88)
N	21128	21128	21128

<i>CABT</i>	[d]	[d/d+1]	[d/d+2]
<i>Revenue increase</i>	-2.63**	-5.60**	-3.56**
	(0.84)	(1.73)	(1.36)
<i>Expenditure decrease</i>	1.71**	3.54**	1.93*
	(0.60)	(1.26)	(0.90)
N	21128	21128	21128

This table reports the average treatment effect (ATE) of as the contrast between and of treated and untreated observations over the event days indicated in the first row of each panel. The ATE was estimated through local projections. is equal to 1 when governments announce that the primary balance will improve every year between and . In Panel A, estimates were obtained on the full sample. In Panel B, estimates were obtained separately for periods of economic expansion and downturn, as indicated in the first column. In Panel C, estimates were obtained separately for periods of economic downturn that are accompanied by an increase in government revenues or a cut in government expenditures, as indicated in the first column. The outcome model was omitted for presentation purposes. Standard errors clustered two-ways at the country and disclosure date level are in brackets. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The variables are listed in the Appendix.

The results indicate that the announcement of future fiscal adjustments is significantly more informative than that of fiscal deteriorations. As shown in Panel A and Figure 2, the immediate impact response of the volatility of returns upon announcements of fiscal adjustments exceeds market-model expectations by 5.7 percentage points. This effect cumulates over the event window, reaching 19.8

percentage points by day $d+2$. Therefore, fiscal plans attract more interest from equity investors when a medium-term fiscal adjustment rather than a deterioration is announced. Besides, trading volumes do not respond more to announcements of planned fiscal adjustments than to those of planned fiscal deterioration.

IV.3. Heterogeneity in the treatment effect of planned fiscal adjustments

Panel B of Table 2 inspects whether the treatment effect of planned fiscal adjustments is state-dependent and reports the ATE of fiscal adjustments for bins defined by the output gap in the year before the announcement. Accordingly, the estimated treatment effect contrasts the volatility of stock returns and trading volume following a future fiscal adjustment announcement instead of a deterioration one, contingent on them being made during economic expansion and deterioration. Periods of expansion (downturn) are defined as years in which the output gap is positive (negative).

The results robustly indicate that only during downturn periods are planned fiscal adjustments more informative than deteriorations. The treatment effect on CABV is positive and statistically significant over the impulse response horizon when the output gap is negative, while it is generally negative and statistically insignificant when the output gap is positive. Considering the ATE reported in the previous table, this finding suggests that the baseline outcomes are driven by governments that plan procyclical fiscal adjustments. Instead, during periods of expansion, the fiscal stance planned by the government –pro or anticyclical– has the same degree of information content. Regarding the treatment effect on CABT, we documented a significant increase in trading volume following announcements of fiscal adjustments in periods of recession but no such effect during economic expansions. Hence, procyclical fiscal adjustments increase opinion divergence among investors. The findings imply that investors disagree about the magnitude of the contractionary effect of fiscal policy during recessions, while they are relatively uniform in their interpretation of fiscal adjustments during expansions.

Panel C of Table 2 expands the investigation of the state-dependent responses of equity investors. Previous studies suggest that the content of fiscal adjustments influences the fiscal multiplier (Alesina et al., 2015; Alesina & Ardagna, 2010; Riera-Crichton et al., 2015). Thus, this analysis aimed to examine whether investors respond differently to procyclical fiscal plans depending on their composition. Accordingly, we sought to determine whether the information content and the consensus effect of fiscal adjustments vary based on the composition of

procyclical fiscal plans. Specifically, we defined a revenue-driven fiscal plan as one that is announced during downturns and that projects an increase in the government's revenue base over the period. We also established an expenditure-driven fiscal plan as one that projects a decrease in government non-interest expenditures and is announced during downturns. We focused on non-interest expenditures, because interest ones are not under the government's control (Ziogas & Panagiotidis, 2021).

The findings indicate that abnormal volatility of returns and trading volume are affected by the composition of the fiscal plan. In particular, we found that fiscal adjustments that entail a revenue increase during downturns are less informative and generate lower opinion divergence than fiscal plans that do not include a revenue increase or that this occurs during expansions. Our evidence further suggests that investors do not have a uniform interpretation of these announcements and that fiscal adjustments are most informative and generate the highest opinion divergence when they involve a cut in expenditures during recessions.

These effects were estimated after reweighting the sample to control for the government's pre-disclosure probability of announcing a fiscal adjustment. We also controlled for contemporaneous market dynamics: bond market movements in all regressions and volatility of returns and bid-ask spread in the abnormal turnover regression. Moreover, we did the same for the contemporaneous growth forecast and the revision of the fiscal forecast. Thus, our findings are unlikely to be driven by contemporaneous, omitted factors affecting equity investors' reactions to announcements of fiscal adjustments. We also included country/year fixed effects to account for the remaining potential confounders. Overall, our identification strategy seems to represent a prudent estimate of the equity market response to fiscal plans.

CONCLUSIONS

This study examined equity investors' responses to fiscal plans launched by the government. Our findings expand the existing literature on the association between fiscal policy and the stock market by analyzing the conditions that make fiscal plans informative for investors (Afonso & Sousa, 2011; Agnello & Sousa, 2013; Ardagna, 2009; Arin et al., 2009; El Montasser et al., 2020; Marfatia et al., 2020). Relying on the fiscal forecasts issued by EU governments in their fiscal plans over the period 2001-2018, which we validated by replicating prior work (Frankel & Schreger, 2013), we showed that fiscal plans predictably forecast medium-term fiscal adjustments, particularly during recessions and when the past fiscal performance is weak. The procyclicality of fiscal policy in the EU is well documented

and is possibly attributable to the functioning of fiscal rules (Caselli & Wingender, 2018; Larch et al., 2021). Our methodological innovation was to apply the predictability of fiscal announcements to design a treatment assignment mechanism based on a fiscal policy rule in line with recent work (Angrist et al., 2018; Angrist & Kuersteiner, 2011). Afterward, we estimated policy propensity scores, which we used to re-randomize the sample and assess impulse response functions through AIPW (Glynn & Quinn, 2009; Jordà & Taylor, 2016). This approach enabled us to evaluate conditions under which equity investors consider fiscal plans informative and therefore credible, and whether fiscal plans succeed in anchoring investors' expectations regarding the future fiscal outlook, which is the primary role of fiscal plans (Leeper, 2009).

We showed that fiscal plans are informative, on average, but investors interpret their content differently. In particular, investors take the greatest interest in those fiscal plans that announce future, medium-term fiscal adjustments. Additionally, we documented that this response is state-dependent and specifically pronounced during economic downturns. Lastly, the evidence indicates that investors are particularly concerned with procyclical, spending-based adjustments. In turn, their opinions diverge the most following these announcements. Collectively, these results reveal that equity investors find fiscal guidance informative when fiscal policy is most likely to have contractionary effects on aggregate demand, but these plans also raise divergent interpretations. The source of this divergence is a promising avenue for future studies, as it may be driven by either uncertainty about the magnitude of procyclical spending multipliers (Riera-Crichton et al., 2015) or the extent to which the government will implement the promised expenditure cuts. This is a hypothesis that, based on the political economy of successful fiscal adjustments (Alesina et al., 1998; Ziogas & Panagiotidis, 2021), we leave for future research.

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