



HAL
open science

The effect of IMF communication on government bond markets: insights from sentiment analysis

Hamza Bennani, Cécile Couharde, Yoan Wallois

► **To cite this version:**

Hamza Bennani, Cécile Couharde, Yoan Wallois. The effect of IMF communication on government bond markets: insights from sentiment analysis. *Review of World Economics*, 2023, 159 (3), pp.615-656. 10.1007/s10290-023-00509-1 . hal-04202545v2

HAL Id: hal-04202545

<https://hal.science/hal-04202545v2>

Submitted on 26 Aug 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

The effect of IMF communication on government bond markets: Insights from sentiment analysis*

Hamza Bennani[†]
Nantes University

Cécile Couharde
University Paris Nanterre

Yoan Wallois
University of Lille

June 2, 2023

Abstract

This article examines whether the IMF sentiment conveyed by the Regional Economic Outlook (REO) provides new information capable of influencing government bond markets. To measure IMF sentiment, we use text mining techniques on an original dataset based on the qualitative content of the REO reports for 16 countries across three regions covered by the REO, *Asia and Pacific*, *Europe*, and *Western Hemisphere*, from 2005 to 2018. Our results suggest that the qualitative content of the REO reports has significant repercussions on bond yields, particularly in the *Asia and Pacific* region, and provides a positive signal in bond markets of countries participating in an IMF program in the *Europe* and *Western Hemisphere* regions. IMF sentiment towards the leading trade partner can also be an essential source of bond markets' reactions. These findings are robust when controlling for IMF quantitative forecasts in the empirical procedure, accounting for an alternative sentiment measure and controlling for other potential determinants of bond yields. They thus shed new light on the importance of IMF communication for guiding and managing markets' expectations.

Keywords: Bond markets, High-frequency, IMF, Sentiment index, Text analysis

JEL classification: F53, G15, Z13

*We are grateful to Jean-Yves Gnabo, Gatién Bon, two anonymous referees as well as participants of the 2021 European Public Choice Society's annual meeting and the 14th Annual Conference on The Political Economy of International Organization for constructive comments and suggestions. All authors declare that they have no conflicts of interest.

[†]Corresponding author: Nantes University, IAE Erdre, Chemin la censive du tertre 44322, Nantes, France. Email: hamza.bennani@univ-nantes.fr.

1. Introduction

Since the 1990s, the environment for multilateral surveillance has become more challenging for the International Monetary Fund (IMF), as reflected by the recurrent episodes of shocks and crises, a surge in members' calls for the Fund to reinvigorate its surveillance activities,¹ and increased concerns about economic and financial stability over the longer term (Lombardi and Woods, 2008). The Fund has adapted in part by stepping up information delivered to its members. As an illustration, the variety and frequency of IMF reports have grown constantly from 2000 to 2015 (see Table A.1 in the Appendix). Until the 2000s, the IMF published one annual document, the World Economic Outlook (WEO). Since then, the IMF has doubled the frequency of this existing publication and issued a range of additional reports, including the Global Financial Stability report (since 2002), the Regional Economic Outlook report (since 2005), and the Fiscal Monitor report (since 2011).

By pooling, analyzing, and disseminating data gathered from member countries, the IMF reports convey new information as well as constant feedback on the Fund's sentiment towards economic performance and policies of its member countries, expressed through positive or negative comments (Breen et al., 2019). This qualitative information can in turn influence financial markets (Lombardi and Woods, 2008). Indeed, to the extent that these documents provide a general assessment and projections of member countries' economic situation, they may lead market participants to revise their expectations about countries' economic conditions and ultimately their allocation decisions. To date, however, very few studies have examined the effect of the qualitative information contained in IMF's communication, such as sentiment, on financial markets. Yet, communication plays a crucial role in crisis management such as with the IMF (see Boin et al., 2016), and sentiments conveyed in documents or speeches are recognized as essential determinants of asset prices, as documented by the literature on central bank communication (see for example Schmeling and Wagner (2019)).

In this paper, we attempt to fill this gap by analyzing how the sentiment of the Fund expressed in its reports may shape government bond yields. In particular, we seek to

¹See the statement of G7 Finance Ministers and Central Bank Governors (<http://www.g7.utoronto.ca/finance/fm103098.htm>), and the memorandum on the Work Program on Strengthening the Architecture of the International Monetary System, issued by the IMF Executive Directors of the G7 countries, to the IMF Director and Executive Board, October 30, 1998 (<https://www.imf.org/external/np/g7/103098ed.htm>)

determine whether market participants pay close attention to the sentiment expressed in the IMF reports or, put differently, whether IMF communication on member countries' economic outlook has the ability to affect market participants' expectations, which is likely to alter government bond yields. We hypothesize that the sentiment of the Fund expressed in its REO reports may shape government bond yields through two channels. First, we assume the existence of a "fundamental information" transmission channel as the IMF's sentiment can provide new and in-depth information about a country's economic fundamentals, which can alter market participants' expectations. In the presence of asymmetric information between policy-makers and the public, communication can contain essential information for market participants. For instance, the IMF's opinion can be more optimistic than what investors would expect, implying a favorable market response, while negative statements from the IMF unanticipated by investors would undermine their confidence. Second, we also assume the presence of a "policy information" transmission channel since the IMF's reports may provide qualitative information on the IMF's own views about the policy choices of a country. This might influence market participants' views of how the IMF may intervene in the economy going forward. Breen et al. (2019) suggest that positive sentiment in an IMF report might signal the Fund's validation of member states' economic policies while, in contrast, a negative view brings with it an obligation to alter the status quo. Consequently, these two channels might change investors' perception about the ability of countries to repay their debts, impacting, therefore, the premia they demand for assets such as sovereign bonds.

Our paper relates to two strands of the literature. The first strand focuses on the effect of IMF news on financial markets, with most studies examining the investor response to IMF news, usually proxied by dummy variables, during financial crises. For instance, Ganapolsky and Schmukler (1998) analyzed the impact of the IMF program-related news during the Tequila crisis in Argentina and found a positive effect on bond and stock returns. Brealey and Kaplanis (2004) conducted a broader study of IMF programs on an extensive range of financial assets, detecting a significant decline in asset prices around announcements of IMF programs. Hayo and Kutan (2005) examined the reaction of financial stock returns in a group of emerging markets to a set of IMF events during the Asian, Russian, and Brazilian crises of 1997-1999. They found that IMF-related news affects daily stock returns while only bad news impacts foreign exchange market returns. Finally, Kutan et al. (2012) expanded this line of research on the stock market into various economic sectors and concluded that IMF news plays an

important role in influencing sectoral returns.

The second strand of the literature involves the use of text mining to analyze IMF publications. Fratzscher and Reynaud (2011) assessed the degree of favorableness in the Public Information Notices (PINs) issued after Executive Board discussions of Article IV consultations with member countries on several topics. For a set of emerging market economies over the period 2001-2007, they found that the degree of favorableness significantly influences the sovereign spreads of most countries. Anderson et al. (2021) analysed the International Monetary and Financial Committee (IMFC) communiqués and constituency statements from 2000 to 2019,² calculating the topic distribution of each statement to explore how the economic policy priorities of the IMF's governing body have evolved over the last two decades. They found a significant emphasis on debt and development issues in the early-2000s, while the late-2000s focused on the financial crisis and the 2010s highlighted economic growth.

Our approach contributes to the literature in two main directions. The first is to expand the growing amount of research trying to establish a link between the influence of the IMF, through its different activities, on financial markets. This literature has traditionally focused on the advice and technical assistance the IMF provides to governments regarding their economic and financial policies, and how these activities can influence financial markets. In this paper, we take a step further in understanding the signaling effect the IMF has on financial markets by examining its reporting activity.

A second contribution relates to the category of IMF reports we focus on, the REO reports. These reports are valuable because they provide an in-depth assessment of a country's economic and financial situation and its policies conducted by the IMF staff. Unlike Article IV Consultations, which involve discussions with countries' authorities, or letters of intent prepared by member countries, the REO reports convey the IMF's sentiment that is not influenced by that of the national authorities. Second, in addition to providing valuable data on a country's economic conditions and government policies, the REO reports convey additional information by putting in perspective the IMF country-specific view in a regional context. These reports may highlight possible cross-border financial instability by examining spillovers and linkages across countries within geographical areas as well as trade tensions and geopolitical risks, which can

²The IMFC advises the IMF Board of Governors on the supervision and management of the international monetary and financial system, in particular during events that may disrupt the system.

further dampen market sentiment. We, therefore, expect these reports to convey relevant information regarding IMF sentiment about the economic outlook of its members relative to their neighboring countries, and provide market participants with new information on the economic outlook of a region and the challenges it faces. Finally, the REO reports are published more frequently and provide more targeted information on IMF member countries than the global reports (the World Economic Outlook and the Global Financial Stability Report) or public statements, such as the IMFC communiqués.

Our approach and results can be summarized as follows. We construct a unique and novel database by extracting text contents from each REO report for a sample of 16 countries from three regions covered by the REO over the period 2005-2018.³ These countries were chosen based on the following criteria: (i) the level of financial development of the region where the country geographically belongs, (ii) the IMF attention towards the country, proxied by the number of times it has been cited in the REO reports and (iii) the availability of financial data at the country level. We measure the IMF sentiment expressed for each country's text content in the REO reports using the General Inquirer's lexicon of positive and negative words, which includes Harvard IV-4 and Lasswell value dictionaries. We find that the 2008 financial crisis led to a significant drop in IMF sentiment across all countries. Some European countries, such as Germany, also experienced a negative IMF sentiment during the sovereign debt crisis. Moreover, the 2011 Chinese economic downturn and the trade tensions between China and the United States coincided with a significant deterioration in IMF sentiment for Asian countries. As a next step, we assess the effect of IMF sentiment on countries' government bond yields. By tracking how yields change in response to IMF communication, we can capture the immediate investor response based on the current and expected future fundamentals. We control for IMF GDP growth and CPI-based inflation forecasts and countries' participation in IMF-Supported Programs to make sure that the qualitative information contained in the REO reports is meaningful, beyond the quantitative economic forecasts and the potential bias in the Fund's sentiment towards countries participating in IMF programs. Our econometric analysis shows that IMF sentiment conveyed by the REO reports provides bond markets with incremental information content. As an illustration, a positive change of IMF sentiment is significantly associated with an easing of financial conditions in countries from the

³Western Hemisphere: Argentina, Brazil, Canada, Mexico and the United States. Europe: France, Germany, Poland, Russia, Turkey and the United Kingdom. Asia and Pacific: Australia, China, India, Japan and South Korea.

Asia and Pacific region. We also find that the IMF qualitative information related to the *Europe* and the *Western Hemisphere* regions is biased towards pessimism, while countries involved in IMF programs in those regions benefit from a more favorable assessment of their economic situation. Finally, IMF sentiment towards the main leading trade partner can also be an essential source of bond markets' reactions, especially in *Asia and the Pacific* region. When shifts in IMF sentiment are associated with changes in domestic bond returns, the effect is independent of any GDP or inflation forecasts provided by the REO reports. Therefore, government bond markets seem to view IMF sentiment as a valuable source of information by itself, regardless of the quantitative assessments contained in the reports. These findings are robust when we use an alternative sentiment measure, we control for the possible preferential treatment received by the main IMF shareholders and major macroeconomic announcements from the US Federal Reserve and the European Central Bank.

The rest of the paper is structured as follows. Section 2. provides an overview of the contents of the REO reports and presents information on the country coverage. Section 3. details the approach we use to measure IMF sentiment based on the REO reports. Section 4. presents our econometric setup, the data, and our main results. Section 5. conducts some robustness checks. The last Section offers some concluding remarks.

2. The Regional Economic Outlook: An overview

The REO reports review the latest economic developments in five regions of the world (*Asia and Pacific, Europe, Middle East and Central Asia, Sub-Saharan Africa, and Western Hemisphere*) and provide discussions of recent growth performance, structural reforms, and the latest forecasts for the economies of these five regions.⁴

The first REO report was published in October 2004, and since then, reports have been released bi-annually in April/May and October/November. The first report of the year is usually the most comprehensive document (80 to 120 pages) and provides many observations and economic policy analysis. The second one, smaller (around 30 pages), is an updated version of the first report.

⁴Figure A.1 in Appendix A shows the geographical coverage of the REO reports.

2.1. An Analysis of the REO reports

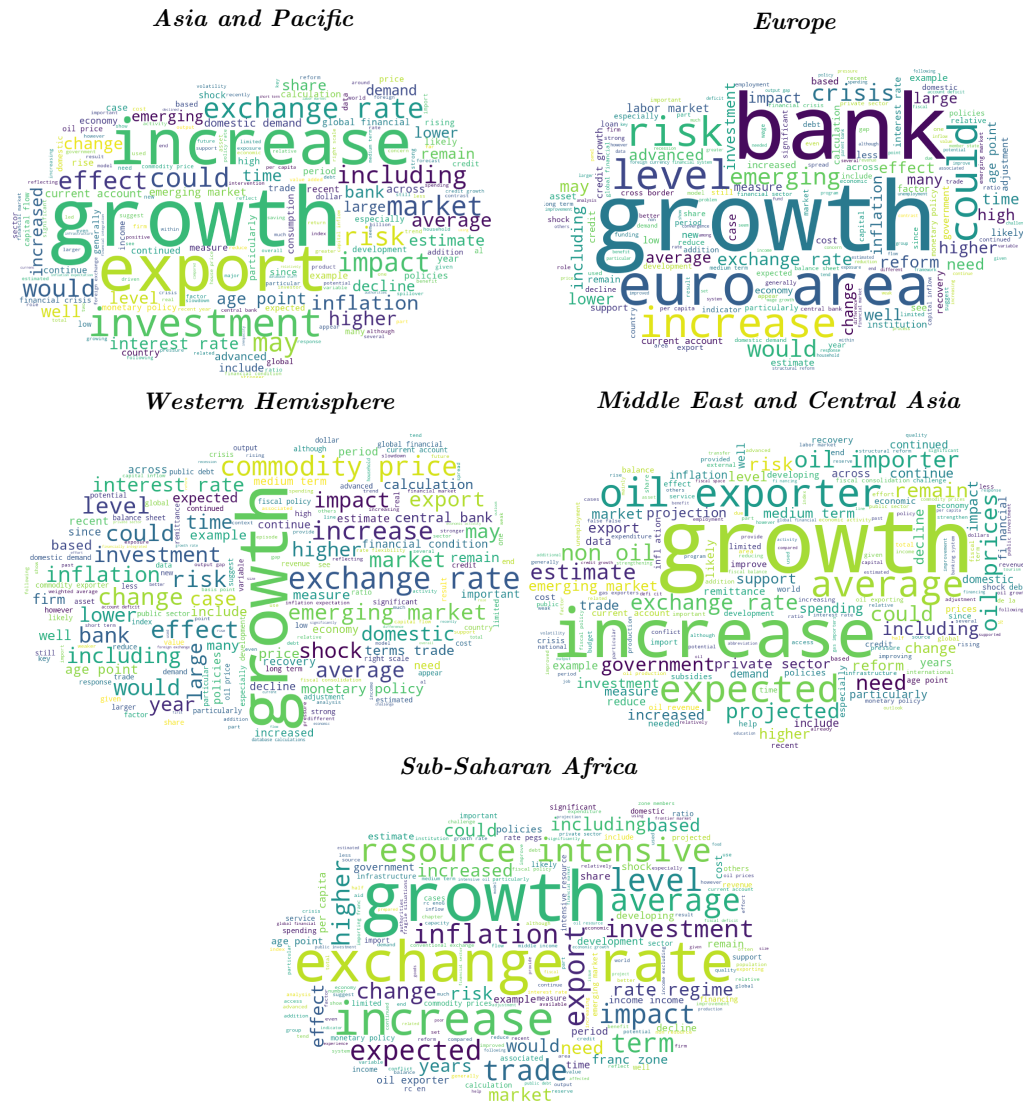
We collect all REO reports from the starting date of publication until the end of 2018.⁵ We extract the most frequently used words/expressions in each region's documents over the sample period. The aim is to highlight regional-specific patterns by identifying the main topics discussed in each region's reports. In Figure 1, each cloud plots the 200 most prominent words/expressions over a total of 5 to 6 million words for each geographical area over the period 2005-2018.

We note that the word "growth" is often quoted in the REO reports of the five regions, although related expressions differ among regions. In *Europe*, the main concerns raised by the IMF seem to be related to financial issues, "banks", and "risks" in particular. Other topics of importance include "exchange rate", "crisis", and "labor market", which are all closely related to macroeconomic fundamentals. For the *Western Hemisphere* region, words and expressions such as "commodity prices", "investment", "inflation", "exchange rate", and "interest rates" are more frequently mentioned. These words refer to fundamentals that either exert a strong influence on economic growth in Latin America or are of particular concern for policymakers, such as the levels of interest rates and exchange rates, given their influence on the sustainability of domestic and external debt in most countries from this region. The word clouds for the *Asia and Pacific* and *Sub-Saharan Africa* regions show some similarities with those of the *Western Hemisphere*. The word "exchange rate" appears frequently in all three regions.

The figure also shows that the word "export" appears frequently in the *Asia and Pacific* region, while "resource intensive" is often used in *Sub-Saharan Africa*. These keywords indicate the important role that exports and commodities play in influencing the business cycles of each region. The REO reports of *Middle East and Central Asia* seem to express more concerns on oil exporters than oil importers, suggesting that the former have been more exposed to shocks during the period. Finally, although words that indicate fluctuations such as "increase", "decline", "lower", and influences such as "effect" and "impact" are common to all regions, they are more prominent in the *Asia and Pacific*, the *Sub-Saharan Africa*, and the *Middle East and Central Asia* regions. This suggests higher economic and financial instability and a stronger dependence of these regions to external conditions.

⁵The publication of the REO report starts at different dates, depending on the regions: in October 2004 for *Sub-Saharan Africa*, September 2005 for the *Asia and Pacific* and *Middle East and Central Asia*, April 2006 for the *Western Hemisphere*, and November 2007 for *Europe*

Figure 1: Word cloud per region, average over the sample period (2005-2018)



Note: The size of the words in the word cloud represents how often they are used in all the reports of a specific region. In other words, larger words appear more frequently in the REO reports of that region.

2.2. An Analysis of the Selected Sample Countries

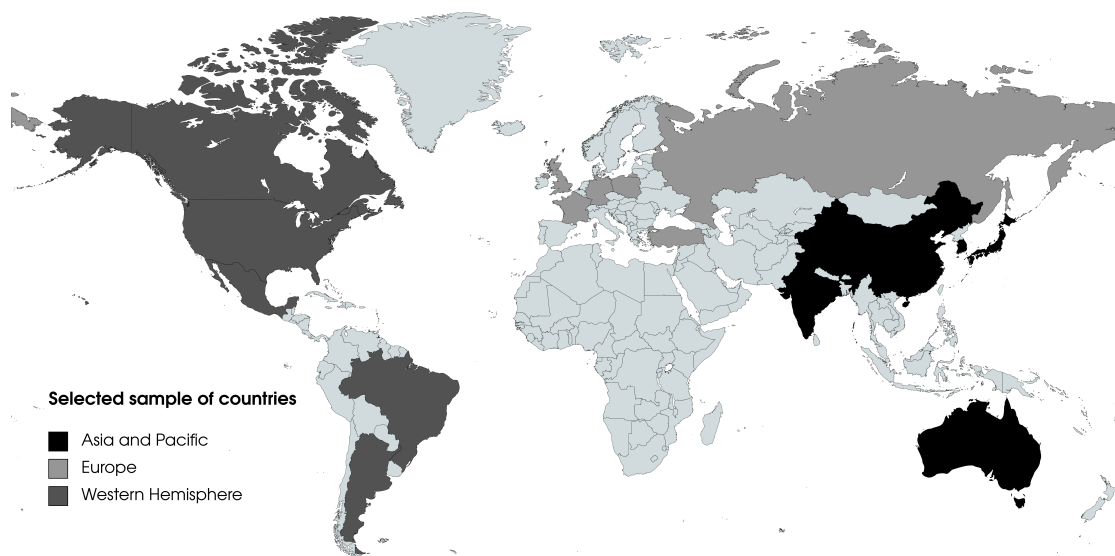
We apply several criteria to select our country sample across the different regions. First, we have to make sure that countries have financial markets sufficiently developed to react to the REO reports' publication. We use the IMF Financial Development Index (FDI), which provides a comprehensive picture of financial institutions and markets

in terms of financial depth, access, and efficiency (Svirydzenka, 2016).⁶ The 2016 FDI index shows that the least financially developed regions were *Sub-Saharan Africa* (0.15) and the *Middle East and Central Asia* (0.27). The unavailability of financial data for most countries belonging to these regions supports the relevance of this first criteria. We thus exclude these regions from our sample. Second, the extraction of countries' citation in the REO reports of the three most financially developed regions (*Europe*, *Western Hemisphere*, and *Asia and Pacific*) suggests that the countries that receive more attention from the IMF are usually the leading contributors to regional GDP. In *Asia and Pacific*, these countries include China, Japan, South Korea, and India; in *Europe*, Germany, France, and the United Kingdom; and in the *Western Hemisphere*, the United States, Canada, Brazil, and Mexico (see Table B.1 in Appendix B). The IMF has also paid significant attention to some smaller emerging economies. However, several of these economies from the *Western Hemisphere* and the *Asia and Pacific* regions have been omitted from the analysis due to a lack of financial data (such as Thailand, Indonesia, Philippines, Chile, Peru, and Colombia). Finally, to avoid sampling bias, we exclude from our sample some countries from Southern Europe (Spain, Italy, and Greece) because of their episodic appearance in the reports only during crisis periods, like e.g. the European sovereign debt crisis.

Therefore, we select among the three most financially developed regions the countries (i) that have been most frequently mentioned and for which financial data are available, and (ii) with potential regional influence as key trading partners or giving their economic weight in the region. Using these criteria, we obtain a sample of 16 countries evenly distributed across the three regions covered by the REO reports. For *Asia and Pacific*: Australia, China, India, Japan, South Korea; for *Europe*: France, Germany, Poland, Russia, Turkey, the United Kingdom; and for *Western Hemisphere*: Argentina, Brazil, Canada, Mexico, and the United States. Figure 2 shows the geographical coverage of our country sample.

⁶Available at: <https://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B>.

Figure 2: Geographical coverage of our country sample



3. Extracting IMF sentiment from the REO reports

Sentiment analysis applications in economics are typically based on either lexicon-based methods or machine learning techniques. Even if machine learning approaches involve a more sophisticated text analysis, they rely on labelled data which is difficult to acquire in our case given the limited availability of the REO reports (21 to 27 reports for each country). Hence, in this paper, we use a lexicon-based approach which prevents researcher subjectivity or bias from entering the study by relying on predetermined dictionaries and disambiguation rules (Twedt and Rees, 2012). Furthermore, this approach is more easily interpretable and follows the literature on sentiment analysis of IMF communication, like e.g. Breen et al. (2019), Mihalyi and Mate (2019), and Anderson et al. (2021).

3.1. A content analysis of the REO reports

We develop a country-based dataset according to the following steps. First, we manually extract the text content related to each country included in our sample by separating parts of the text that relate to the country of interest from parts that deal with regional issues. This process enables us to convert the information provided at a regional scale to a country-specific level. Second, we manually identify the relevant paragraphs and

sentences following the principle of parsimony. We select (i) paragraphs and frames that exclusively focus on the country of interest and the (ii) sentences that quote a specific pattern of the country (adding the previous or the following sentences if they are tightly related). Consequently, we obtain a time-varying transcript for each country included in our sample. Third, we extract and quantify the sentiment expressed by the IMF in the REO reports for each country. For this purpose, we use a bag-of-words approach with a rule-based method of extraction from the texts for each country. This method represents all the words appearing in the REO reports as a document-term matrix. The matrix elements capture the information value of each word in each REO report, corresponding to the relative frequencies of words that convey positive and negative sentiment within the report.

To identify these words, we use the General Inquirer (GI), mostly built on the Harvard-IV and Lasswell dictionaries. The GI contains 1,915 (2,291) words that express a positive (negative) sentiment. We only take into account GI words that are extracted from IMF reports⁷ and carefully examine the context in which each positive and negative word is used so that it accurately refers to a country, and there is no double negation. By doing this, we aim to reduce measurement errors in the IMF sentiment measure towards a particular country. Given the variety of issues addressed in IMF reports, such as political instability, financial matters, and social unrest, a general dictionary like the GI is more suitable for measuring sentiment than a specialized finance dictionary, such as the Loughran and McDonald lexicon (Loughran and McDonald, 2011, 2020), which may overlook these varied aspects, leading to misclassification and spurious correlations.

The following sentences provide evidence of statements with either a positive (bold and underlined) or a negative (italics and underlined) tone, as identified by the GI:

“Contrary to previous episodes, reserve accumulation has been driven primarily by current account surpluses, rather than capital inflows, reflecting **favorable** terms of trade (especially in Argentina, Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela; and to a lesser extent in Mexico), stronger fiscal positions, and relatively competitive real exchange rates.”

—IMF REO report for the *Western Hemisphere* region, 02 November 2006.

⁷GI words that are not relevant to IMF reports are excluded from the analysis by default.

“Growth is expected to remain around 1/2 percent for 2015, with heavy foreign exchange controls continuing to *depress* investment and imports, while the weakening terms of trade, the ongoing *recession* in Brazil (Argentina’s main trading partner), and the real appreciation of the peso weigh on exports and contribute to a further *decline* in the trade surplus.”

—IMF REO report for the *Western Hemisphere* region, 07 October 2015.

We use these word lists to select positive and negative words in each REO report that depict the economic conditions for each of the selected countries. Table B.1 in Appendix B displays some descriptive statistics on the average share of positive and negative words identified by the GI across countries and over the sample period (from the second half of 2005 to the end of 2018). We note that, on average, the share of positive words is higher than the share of negative words, except for Russia. This indicates that the REO reports for the observed period have conveyed more positive than negative sentiments. Poland exhibits the highest share of positive words (7.6%) and the United Kingdom the lowest (2.8%). The highest percentage of negative words is found in Russia (6.3%), and the lowest in France (2.1%).

3.2. Measuring IMF sentiment

We combine the positive and the negative words to produce a sentiment measure for each country i quoted in each REO report published on date t . We use a relative measure to better identify whether a piece of text is relatively positive or relatively negative and to evaluate the magnitude of sentiment compared to the text length. This relative measure, $T_{i,t}$, subtracts the share of positive words from the share of negative words over the sum of positive and negative words:

$$T_{i,t} = \frac{Pos_{i,t} - Neg_{i,t}}{Pos_{i,t} + Neg_{i,t}}; \quad (1)$$

where $Pos_{i,t}$ and $Neg_{i,t}$ reflect the number of positive and negative words, respectively. A higher value of $T_{i,t}$ is indicative of a more positive sentiment about the economic conditions of a given country i in the REO report published at a particular time t .

This sentiment measure is standardized⁸ to adjust for changes in the distribution of

⁸The standardization consists, for each sentiment measure, in subtracting the sample period’s mean and dividing by the sample period’s standard deviation of the sentiment measure.

words that convey the tone through the different reports,⁹ enabling more accurate comparisons over time and across countries. Figures B.1, B.2, and B.3 in Appendix B report the evolution of the standardized scores (Z-scores) for the sentiment measure, denoted $t_{i,t}$, for each country over the sample period.¹⁰ Unsurprisingly, the figures show that the 2008 financial crisis led to relatively synchronous troughs since it severely hit the global economy. However, the sentiment measure displays some differences across countries and time variation. In particular, IMF sentiment was particularly negative (more pessimistic sentiment) towards Russia and Turkey following the global crisis of 2008. In fact, the minimum sentiment realization has not been just confined to this episode. In Germany, for example, the minimum sentiment occurred during the European sovereign debt episode. In the *Asia and Pacific* region, IMF sentiment has been more volatile since the early 2000s. The economic downturn of China in 2011 has coincided with the peak reached by IMF negative sentiment towards this country. This confidence drop has contaminated other Asian economies and emerging countries due to the central role played by China in world trade. A significant deterioration in IMF sentiment towards the United States can be seen in October 2013, coinciding with expectations of a fiscal cliff (large spending cuts and tax increases) that could have thrown the US economy into recession. By the end of the period, IMF sentiment towards most countries became negative, possibly due to the rising trade tensions between the United States and China.

4. IMF sentiment and bond markets

In this section, we investigate the extent to which changes in IMF sentiment generate responses of government bond yields around the publication of a REO report and during the post-publication period. This allows us to consider that the market still absorbs news after several days, which is supported by the literature (Evans and Lyons, 2005). Two main assumptions underlie our approach: (i) during the time window around the release day, news contained in a REO report dominates all other news in government bond markets, and (ii) asset prices are forward-looking and react over very short time windows (less than a week) and accurately to the news provided in the REO reports. Reactions over a broader time window could be influenced by other factors like monetary or fiscal policy news. Therefore, when conducting our analysis, we use a time window of up to four days, which is wide enough to capture all relevant effects, but not so wide

⁹These changes might be explained by variations in the writing style due to turnover in the IMF's writing teams.

¹⁰Positive (negative) Z-scores indicate that the degree of optimism (pessimism) in the text is above (below) average.

to exclude the influence of other events.

4.1. Econometric set-up

We follow our main hypothesis that IMF sentiment conveyed in the REO reports influences bond yields by providing qualitative information about the economic situation of a country – a “fundamental information” transmission channel – and the IMF’s own views on the country’s policy choices, a “policy information” transmission channel.

Since we have a relatively small number of observations for each country (21 to 27), we cannot divide the countries into smaller groups within each region or group them with countries from other regions based on their level of development. This is because REO reports are published at different times. So, our only option is to group countries by the geographical divisions used in the REO reports and estimate separate panel models for each region.

We follow the standard methodology used in the literature that highlights institutional peculiarities in domestic bond markets (see, for example, Jaramillo and Weber (2013)) by introducing time-invariant country characteristics in the form of fixed effects.¹¹ The basic regression, for each country i , takes the form:

$$r_{i,t+h} - r_{i,t-1} = \mu_i + \alpha^h \Delta T_{i,t} + \epsilon_{i,t}; \quad (2)$$

where $r_{i,t+h} - r_{i,t-1}$ reflects cumulative changes over h days of government bond yields in the country i .¹² h stands for the different time windows used to calculate the cumulative returns. $\Delta T_{i,t}$ is the first difference of the IMF sentiment measure for country i at time t between two subsequent reports. μ_i denotes country fixed effects. Finally, $\epsilon_{i,t}$ is a stochastic error term that captures the effect of other factors that influence bond returns.

We control for countries’ participation in IMF programs to check whether this affects the relationship between bond yields and IMF sentiment. There is ample evidence that the Fund’s assistance affects financial returns (Brealey and Kaplanis, 2004). By

¹¹We performed the Hausman test (Hausman, 1978) to check whether a fixed effects model is preferable to a random effects model. The test show a strong and significant heterogeneity amongst countries for most regressions. We thereby consider that a fixed-effect specification matches better the data generating process.

¹² $\sum_{i=0}^h (r_{i,t+i} - r_{i,t-1}) = (r_{i,t+h} - r_{i,t+h-1}) + \dots + (r_{i,t} - r_{i,t-1}) = r_{i,t+h} - r_{i,t-1}$.

involving a combination of adjustment and financing, programs negotiated with the IMF can signal to market participants how costly they might be or how much they might ease the external constraints of the countries involved. To investigate this issue, we introduce a variable, IMF program, which is captured through a dummy variable ($IMF_{i,t}$). If a country i has an agreement with the IMF in a given year t , the dummy variable takes the value “1” and “0” otherwise. Additionally, we include an interaction term between this dummy variable and the sentiment variable to examine whether changes in IMF sentiment affect bond returns differently in countries under an IMF program.

Finally, to determine whether the asset price movement around the release day of the REO report is a reaction to the qualitative information in the text or the updated IMF forecasts provided in the REO reports, we control for GDP growth and CPI-based inflation forecasts, when they are available in the REO reports. By doing so, we aim to assess whether the qualitative information contained in the IMF reports, i.e. the sentiment, provides additional information to market participants beyond the quantitative ones, i.e. the economic forecasts, thus establishing the existence of a “fundamental information” transmission channel. As a result, Eq. (2) becomes:

$$r_{i,t+h} - r_{i,t-1} = \mu_i + \alpha_1^h \Delta T_{i,t} + \alpha_2^h IMF_{i,t} + \alpha_3^h (\Delta T_{i,t} \times IMF_{i,t}) + \beta_1^h \Delta g_{i,t}^f + \beta_2^h \Delta \pi_{i,t}^f + \epsilon_{i,t}; \quad (3)$$

where $\Delta g_{i,t}^f$ and $\Delta \pi_{i,t}^f$ reflect changes in the GDP growth and CPI-based inflation forecasts of country i , respectively, between two subsequent reports. The coefficient α_1^h stands for the sentiment effect on domestic bond markets for countries not participating in an IMF program. The coefficient α_2^h measures the direct relationship of IMF programs on domestic bond markets, whereas the sum of the two coefficients, $\alpha_2^h + \alpha_3^h$, represents the sentiment effect for countries under an IMF program.

Eq. (3) is estimated for the period spanning from September 2005 until December 2018. We perform a modified Wald test to detect the possible presence of groupwise heteroskedasticity in the residuals of our fixed-effect regressions, and a Breusch-Pagan LM test to check for cross-sectional dependence in the error term. Tests’ results suggest that we should not use the standard fixed effect procedure without considering spatial correlation and panel heteroskedasticity. Therefore, we use a panel corrected standard

errors (PCSEs) estimator developed by Beck and Katz (1995) for all our estimates. This estimator suits best to small panels and accounts for finite sample bias while producing panel-corrected standard errors that allow heteroskedasticity and correlation within panels.

4.2. Data

We collect the 5-year and 10-year yields on government bonds from Thomson Reuters for each country from September 2005, i.e. the start of our sample period, to December 2018.¹³ We compute for each country i 's 5 and 10-year government bond yields (i) the one-day return calculated between the day of publication (t) and the previous day ($i_{i,t}^{5y}$, $i_{i,t}^{10y}$), and (ii) the cumulative return calculated over h days following the day of publication ($i_{i,t+h}^{5y}$, $i_{i,t+h}^{10y}$) with $h=1, \dots, 4$. We follow the financial literature and employ a Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model à la Bollerslev (1986) to capture the time-varying volatility in bond returns. Specifically, we use a GARCH(1,1) model as the first lag is usually sufficient to capture the movements of the volatility (Javed and Mantalos, 2013).¹⁴

Since the REO reports are released twice a year, we are able to compute changes in the GDP growth and CPI-based inflation forecasts of each country i between two subsequent reports. However, the CPI-based inflation forecasts are missing for the *Asia and Pacific* region in the REO reports. Finally, the list of countries and the period during which they were under IMF programs are obtained from the IMF's Monitoring of Fund Arrangements database.¹⁵ Countries under IMF programs in our sample period are Turkey¹⁶, and Poland¹⁷ for the *Europe* region. In the *Western Hemisphere* region, Argentina¹⁸ and Mexico¹⁹ participated in IMF-supported programs, while no country in the *Asia Pacific* region was concerned by the IMF's financial assistance over the study period.

¹³Due to data availability, this analysis is not carried out for Turkey, Argentina, and Australia. Similarly, it is not possible to extend the analysis to the 20-year and 30-year government bond yields.

¹⁴For the sake of brevity, the results are not reported in the paper but are available from the authors upon request.

¹⁵See <https://www.imf.org/external/np/pdr/mona/Country.aspx>.

¹⁶Standby Agreement from 05/11/2005 to 05/10/2008.

¹⁷5 Flexible Credit Lines from 05/06/2009 to 11/02/2017.

¹⁸Standby Agreement approved on 20/06/2018.

¹⁹8 Flexible Credit Lines from 17/04/2009 to 21/11/2021.

4.3. Baseline results

Table 1 reports the estimated values for the parameters of interest of Eq. (3) according to the region covered by the REO reports, and the time horizon used to calculate cumulative changes of 5-year and 10-year government bond yields.

The results yield statistically significant evidence of bond markets' reaction in the *Asia and Pacific* region. We find that a more positive IMF sentiment is correlated with lower domestic bond yields on the day the REO reports are released. Specifically, a one SD increase in IMF sentiment is associated with a decrease of 20% of a SD in the 5-year bond yields and 34% SD in the 10-year bond yields on the REO release day.

In contrast, in the *Europe* region, the coefficient associated with IMF sentiment is positive and significant several days after the report's release for the 5-year and 10-year bond yields. This positive relationship might reflect the optimistic expectations that financial markets have, on average, about the European region's economic and financial outlook, and which are not necessarily consistent with the economic and financial analysis provided in the REO reports. This result is in line with Batchelor (2001), who compares IMF forecasts to those of the private sector forecasts and shows that IMF forecasts can be biased toward pessimism compared to the Consensus Economic forecasts. Furthermore, several studies find that forecasts realized by European countries are more optimistic than those made by international organizations such as the IMF (Jonung and Larch, 2006; Hallerberg et al., 2009; Marinheiro, 2011). According to Frankel and Schreger (2013), the constraints imposed by the Stability and Growth Pact might explain this optimism in the European Union.²⁰ However, the participation in an IMF program seems to provide a positive signal to bond markets, causing a significant decline in the 5-year bond yields in European markets on the day the REO report is released. The positive signaling effect of being under a Fund program is confirmed by the sign and significance of the interaction term between the IMF program dummy and IMF sentiment.

Similar to *Europe*, the effect of IMF sentiment on the 5-year bond yields in *Western Hemisphere* appears to be long-lasting with a positive and significant coefficient – up to five days after the release of the REO report, while the effect of IMF sentiment and

²⁰Specifically, euro area countries appear to have responded to the 3% limit imposed by the Stability and Growth Pact by offering optimistic forecasts when they are most in danger of breaching the limit.

IMF programs is no more statistically significant across the different time horizons for the 10-year bond yields. The rise in the 5-year bond yields may reflect a bias toward pessimism in the IMF qualitative information compared to market expectations. As an illustration, Dreher et al. (2008)'s focus on the political economy of IMF forecasts lead them to conclude that some countries opposed to the IMF's major shareholders may receive a more pessimistic evaluation from the IMF. Nevertheless, for countries under an IMF program, the market response to the release of IMF qualitative information drives bond yields lower. This finding suggests that financial markets in the *Western Hemisphere* region perceive IMF programs as being credible and beneficial for countries' economic conditions. Finally, this region is the only one where quantitative forecasts have a significant relationship with bond yields. Indeed, the market response to IMF inflation forecasts is significant several days after the report's release and positive as expected. Higher inflation expectations tend to signal a possible rise in nominal interest rates and thus, an increase in the borrowing costs of long-term government securities.

In summary, we find that IMF sentiment conveyed by the REO reports moves bond yields, and thus, provides relevant qualitative information to financial market participants about countries' economic conditions. More precisely, in *Asia and Pacific*, positive IMF sentiment is associated with a decrease in bond yields, indicating easier financial conditions. However, in *Europe* and the *Western Hemisphere*, bond yields increase after the release of the REO report, suggesting that the IMF's assessment of economic conditions in these regions is more pessimistic than expected by market participants. Additionally, in countries under an IMF program, positive IMF sentiment leads to a decrease in 5-year (in *Europe* and the *Western Hemisphere*) and 10-year bond yields (in *Europe*), indicating a positive perception of IMF programs by market participants.

Table 1: Testing the effect of changes in the IMF sentiment on cumulative changes in 5-year and 10-year bond yields

<i>Asia and Pacific</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	-0.908*	-0.883	-0.943	-0.935	-1.082	-1.026***	-0.821	-1.383**	-1.640**	-1.842*
	(0.054)	(0.220)	(0.160)	(0.264)	(0.296)	(0.001)	(0.165)	(0.024)	(0.033)	(0.060)
$\Delta g_{i,t}^f$	0.0705	0.0798	-0.0523	-0.252*	-0.112	0.0285	0.0583	-0.0276	-0.172	-0.185
	(0.465)	(0.607)	(0.677)	(0.091)	(0.589)	(0.655)	(0.666)	(0.829)	(0.218)	(0.343)
Obs.	100	100	100	100	100	100	100	100	100	100
<i>Europe</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	0.732***	1.086***	1.818***	1.672**	1.797***	0.283	0.686*	1.485**	1.380*	1.697**
	(0.008)	(0.008)	(0.001)	(0.014)	(0.009)	(0.207)	(0.096)	(0.011)	(0.060)	(0.018)
$IMF_{i,t}$	-0.447*	-0.742	-0.678	-0.367	-0.473	-0.863***	-1.154***	-1.073	-0.613	-1.112
	(0.082)	(0.193)	(0.563)	(0.777)	(0.677)	(0.002)	(0.000)	(0.179)	(0.454)	(0.204)
$\Delta T_{i,t} \times IMF_{i,t}$	-1.261**	-0.514	-1.744	-2.488	-2.195	-0.402	-0.537	-1.503	-2.303*	-2.329*
	(0.011)	(0.615)	(0.390)	(0.224)	(0.267)	(0.374)	(0.354)	(0.251)	(0.072)	(0.090)
$\Delta g_{i,t}^f$	0.000324	0.166	0.0957	0.0427	0.0830	-0.0153	0.0761	0.0944	0.0409	0.113
	(0.996)	(0.179)	(0.604)	(0.830)	(0.674)	(0.766)	(0.222)	(0.415)	(0.785)	(0.442)
$\Delta \pi_{i,t}^f$	0.0434	0.0744	0.0722	-0.00875	0.120	0.0196	0.0624	0.143	-0.000559	0.105
	(0.565)	(0.596)	(0.694)	(0.964)	(0.524)	(0.668)	(0.428)	(0.223)	(0.997)	(0.445)
Obs.	56	56	56	56	56	56	56	56	56	56
<i>Western Hemisphere</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	1.351***	1.310**	1.404*	1.596**	1.631**	-0.510	-0.391	-0.329	-0.321	-0.206
	(0.007)	(0.041)	(0.055)	(0.025)	(0.035)	(0.181)	(0.429)	(0.595)	(0.603)	(0.765)
$IMF_{i,t}$	-0.592**	-0.889**	-0.893*	-0.869**	-1.012**	0.124	-0.151	-0.147	0.0236	0.218
	(0.037)	(0.019)	(0.053)	(0.037)	(0.035)	(0.697)	(0.676)	(0.767)	(0.961)	(0.690)
$\Delta T_{i,t} \times IMF_{i,t}$	-2.571***	-3.041**	-2.215	-1.979	-2.661*	-0.538	-1.584	-0.413	-0.473	-1.392
	(0.002)	(0.020)	(0.152)	(0.140)	(0.099)	(0.530)	(0.218)	(0.799)	(0.777)	(0.364)
$\Delta g_{i,t}^f$	0.0719	0.0369	-0.00902	0.0267	-0.0229	0.0767	-0.0363	-0.0825	-0.0787	-0.0992
	(0.606)	(0.795)	(0.958)	(0.871)	(0.902)	(0.494)	(0.742)	(0.598)	(0.627)	(0.612)
$\Delta \pi_{i,t}^f$	0.636***	0.774***	0.961***	0.940***	0.767***	0.311*	0.293	0.316	0.328	0.260
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.055)	(0.133)	(0.224)	(0.215)	(0.350)
Obs.	90	90	90	90	90	90	90	90	90	90

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCE) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.

4.4. Adding IMF sentiment towards the main trade partner

The REO reports' purpose is also to better understand regional economic effects by analyzing spillovers and linkages within geographical areas. The word clouds depicted in Figure 1 show that some regions are heavily dependent on external economic and financial conditions. One might, therefore, conjecture that a higher financial and trade

integration allows domestic bond markets to also respond to IMF sentiment towards foreign countries. To proxy for the economic interdependence across countries, we appeal to an easy-to-interpret measure by selecting the sentiment measure towards the main regional trading partner j of each country i , $T_{j,t}$. Therefore, we augment our baseline specification, Eq. (3), as follows:

$$r_{i,t+h} - r_{i,t-1} = \mu_i + \alpha_1^h \Delta T_{i,t} + \alpha_2^h IMF_{i,t} + \alpha_3^h (\Delta T_{i,t} \times IMF_{i,t}) + \beta_1^h \Delta g_{i,t}^f + \beta_2^h \Delta \pi_{i,t}^f + \beta_3^h \Delta T_{j,t} + \epsilon_{i,t}; \quad (4)$$

where $\Delta T_{j,t}$ is the first difference of the sentiment measure for country i 's main regional trading partner, j , at time t , between two subsequent reports.

Table B.2 in Appendix B reports the selected trading partner for each country. Unsurprisingly, China is the major trading partner of countries from the *Asia and Pacific* region, while in the *Europe* and *Western Hemisphere* regions, no single country emerges as the major player in the regional trade. Tables 2 and 3 present the results of our analysis when we include the sentiment measure towards each country's main regional trading partner.

In the *Asia and Pacific* region, the relationship between IMF sentiment towards the domestic economy and the 5-year bond yields does not appear to be as significant as the relationship with IMF sentiment towards the main trading partner. The latter seems to serve as an indirect signal about the economic situation of the region, which might explain the significant market response. The 10-year yields in this region are also significantly related to IMF sentiment towards the main trading partner of each domestic economy. These findings can be explained by the fact that the REO reports of the *Asia and Pacific* region deal mainly with the Chinese economy, the leading trading partner for several countries in this region (see Table B.2 in Appendix C). Financial markets in these countries are thus primarily driven by the Chinese economy. Consequently, a positive assessment of China in the IMF REO is associated, on average, with a persistent decrease of 10-year bond yields in Japan, South Korea, India, and Australia over several days. Finally, in the *Europe* and *Western Hemisphere* regions, the coefficients associated with IMF sentiment towards the main regional trading partner are not significant. Nevertheless, the main results remain similar, in terms of sign and significance, to the baseline ones (see Table 1).

Table 2: Testing the effect of changes in the IMF sentiment on cumulative changes in 5-year bond yields, controlling for IMF sentiment towards the main trade partner

<i>Asia and Pacific</i>										
	i_t^{5y}		i_{t+1}^{5y}		i_{t+2}^{5y}		i_{t+3}^{5y}		i_{t+4}^{5y}	
$\Delta T_{i,t}$	-0.908*	-0.453	-0.883	-0.0292	-0.943	-0.208	-0.935	-0.421	-1.082	-0.152
	(0.054)	(0.348)	(0.220)	(0.968)	(0.160)	(0.755)	(0.264)	(0.633)	(0.296)	(0.885)
$\Delta g_{i,t}^f$	0.0705	0.0788	0.0798	0.113	-0.0523	-0.0479	-0.252*	-0.235	-0.112	-0.0584
	(0.465)	(0.376)	(0.607)	(0.420)	(0.677)	(0.686)	(0.091)	(0.117)	(0.589)	(0.767)
$\Delta T_{j,t}$		-1.486**		-2.749***		-2.388***		-1.640		-2.850**
		(0.017)		(0.005)		(0.006)		(0.140)		(0.036)
Obs.	100	100	100	100	100	100	100	100	100	100
<i>Europe</i>										
	i_t^{5y}		i_{t+1}^{5y}		i_{t+2}^{5y}		i_{t+3}^{5y}		i_{t+4}^{5y}	
$\Delta T_{i,t}$	0.732***	0.745**	1.086***	1.204***	1.818***	2.079***	1.672**	2.080***	1.797***	2.212***
	(0.008)	(0.012)	(0.008)	(0.005)	(0.001)	(0.001)	(0.014)	(0.004)	(0.009)	(0.002)
$IMF_{i,t}$	-0.447*	-0.465	-0.742	-0.658	-0.678	-0.723	-0.367	-0.561	-0.473	-0.524
	(0.082)	(0.146)	(0.193)	(0.392)	(0.563)	(0.634)	(0.777)	(0.728)	(0.677)	(0.727)
$\Delta T_{i,t} \times IMF_{i,t}$	-1.261**	-1.784***	-0.514	-1.809	-1.744	-2.978	-2.488	-4.134*	-2.195	-3.886*
	(0.011)	(0.003)	(0.615)	(0.141)	(0.390)	(0.201)	(0.224)	(0.069)	(0.267)	(0.087)
$\Delta g_{i,t}^f$	0.000324	-0.0161	0.166	0.136	0.0957	0.0338	0.0427	-0.0453	0.0830	-0.0213
	(0.996)	(0.807)	(0.179)	(0.295)	(0.604)	(0.851)	(0.830)	(0.804)	(0.674)	(0.907)
$\Delta \pi_{i,t}^f$	0.0434	0.0868	0.0744	0.0122	0.0722	0.206	-0.00875	0.131	0.120	0.132
	(0.565)	(0.462)	(0.596)	(0.957)	(0.694)	(0.500)	(0.964)	(0.681)	(0.524)	(0.670)
$\Delta T_{j,t}$		0.107		0.203		0.110		0.135		0.493
		(0.532)		(0.452)		(0.769)		(0.763)		(0.237)
Obs.	56	46	56	46	56	46	56	46	56	46
<i>Western Hemisphere</i>										
	i_t^{5y}		i_{t+1}^{5y}		i_{t+2}^{5y}		i_{t+3}^{5y}		i_{t+4}^{5y}	
$\Delta T_{i,t}$	1.351***	1.926***	1.310**	1.848***	1.404*	2.094***	1.596**	2.266***	1.631**	2.333***
	(0.007)	(0.001)	(0.041)	(0.007)	(0.055)	(0.009)	(0.025)	(0.004)	(0.035)	(0.006)
$IMF_{i,t}$	-0.592**	-0.621**	-0.889**	-0.835**	-0.893*	-0.909*	-0.869**	-0.928**	-1.012**	-1.056**
	(0.037)	(0.043)	(0.019)	(0.034)	(0.053)	(0.062)	(0.037)	(0.036)	(0.035)	(0.035)
$\Delta T_{i,t} \times IMF_{i,t}$	-2.571***	-3.225***	-3.041**	-3.655***	-2.215	-3.013*	-1.979	-2.743*	-2.661*	-3.419*
	(0.002)	(0.001)	(0.020)	(0.007)	(0.152)	(0.071)	(0.140)	(0.067)	(0.099)	(0.051)
$\Delta g_{i,t}^f$	0.0719	0.0509	0.0369	0.0220	-0.00902	-0.0467	0.0267	-0.0108	-0.0229	-0.0739
	(0.606)	(0.714)	(0.795)	(0.877)	(0.958)	(0.784)	(0.871)	(0.948)	(0.902)	(0.688)
$\Delta \pi_{i,t}^f$	0.636***	0.718***	0.774***	0.872***	0.961***	1.110***	0.940***	1.097***	0.767***	0.964***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.001)
$\Delta T_{j,t}$		-0.545		-0.384		-0.355		-0.418		-0.833
		(0.175)		(0.479)		(0.600)		(0.519)		(0.214)
Obs.	90	82	90	82	90	82	90	82	90	82

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCE) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.

Table 3: Testing the effect of changes in the IMF sentiment on cumulative changes in 10-year bond yields, controlling for IMF sentiment towards the main trade partner

<i>Asia and Pacific</i>										
	i_t^{10y}		i_{t+1}^{10y}		i_{t+2}^{10y}		i_{t+3}^{10y}		i_{t+4}^{10y}	
$\Delta T_{i,t}$	-1.026***	-0.728**	-0.821	0.0593	-1.383**	-0.430	-1.640**	-0.931	-1.842*	-0.684
	(0.001)	(0.016)	(0.165)	(0.913)	(0.024)	(0.476)	(0.033)	(0.234)	(0.060)	(0.456)
$\Delta g_{i,t}^f$	0.0285	0.0377	0.0583	0.108	-0.0276	-0.0228	-0.172	-0.169	-0.185	-0.148
	(0.655)	(0.529)	(0.666)	(0.366)	(0.829)	(0.842)	(0.218)	(0.210)	(0.343)	(0.394)
$\Delta T_{j,t}$		-0.866**		-2.707***		-2.953***		-2.338**		-3.918***
		(0.033)		(0.001)		(0.000)		(0.016)		(0.001)
Obs.	100	100	100	100	100	100	100	100	100	100
<i>Europe</i>										
	i_t^{10y}		i_{t+1}^{10y}		i_{t+2}^{10y}		i_{t+3}^{10y}		i_{t+4}^{10y}	
$\Delta T_{i,t}$	0.283	0.190	0.686*	0.694	1.485**	1.665***	1.380*	1.638**	1.697**	2.027***
	(0.207)	(0.378)	(0.096)	(0.102)	(0.011)	(0.007)	(0.060)	(0.031)	(0.018)	(0.010)
$IMF_{i,t}$	-0.863***	-0.854**	-1.154***	-1.019**	-1.073	-1.000	-0.613	-0.844	-1.112	-0.907
	(0.002)	(0.011)	(0.000)	(0.012)	(0.179)	(0.328)	(0.454)	(0.417)	(0.204)	(0.411)
$\Delta T_{i,t} \times IMF_{i,t}$	-0.402	-0.561	-0.537	-1.259**	-1.503	-2.656*	-2.303*	-3.200***	-2.329*	-3.721**
	(0.374)	(0.221)	(0.354)	(0.029)	(0.251)	(0.055)	(0.072)	(0.007)	(0.090)	(0.013)
$\Delta g_{i,t}^f$	-0.0153	-0.0432	0.0761	0.0606	0.0944	0.0702	0.0409	-0.0248	0.113	0.0613
	(0.766)	(0.373)	(0.222)	(0.370)	(0.415)	(0.560)	(0.785)	(0.871)	(0.442)	(0.682)
$\Delta \pi_{i,t}^f$	0.0196	0.0330	0.0624	0.0570	0.143	0.174	-0.000559	0.241	0.105	0.141
	(0.668)	(0.648)	(0.428)	(0.676)	(0.223)	(0.380)	(0.997)	(0.332)	(0.445)	(0.561)
$\Delta T_{j,t}$		0.294**		0.172		0.0632		0.166		0.455
		(0.048)		(0.463)		(0.840)		(0.706)		(0.328)
Obs.	56	46	56	46	56	46	56	46	56	46
<i>Western Hemisphere</i>										
	i_t^{10y}		i_{t+1}^{10y}		i_{t+2}^{10y}		i_{t+3}^{10y}		i_{t+4}^{10y}	
$\Delta T_{i,t}$	-0.510	-0.337	-0.391	-0.215	-0.329	0.00400	-0.321	0.00771	-0.206	0.190
	(0.181)	(0.424)	(0.429)	(0.675)	(0.595)	(0.995)	(0.603)	(0.991)	(0.765)	(0.791)
$IMF_{i,t}$	0.124	0.157	-0.151	-0.0897	-0.147	-0.104	0.0236	0.0219	0.218	0.223
	(0.697)	(0.627)	(0.676)	(0.809)	(0.767)	(0.837)	(0.961)	(0.964)	(0.690)	(0.683)
$\Delta T_{i,t} \times IMF_{i,t}$	-0.538	-0.755	-1.584	-1.774	-0.413	-0.778	-0.473	-0.832	-1.392	-1.866
	(0.530)	(0.406)	(0.218)	(0.173)	(0.799)	(0.638)	(0.777)	(0.631)	(0.364)	(0.243)
$\Delta g_{i,t}^f$	0.0767	0.0576	-0.0363	-0.0477	-0.0825	-0.113	-0.0787	-0.111	-0.0992	-0.146
	(0.494)	(0.606)	(0.742)	(0.665)	(0.598)	(0.462)	(0.627)	(0.482)	(0.612)	(0.444)
$\Delta \pi_{i,t}^f$	0.311*	0.374**	0.293	0.347*	0.316	0.433	0.328	0.441	0.260	0.413
	(0.055)	(0.026)	(0.133)	(0.088)	(0.224)	(0.104)	(0.215)	(0.105)	(0.350)	(0.151)
$\Delta T_{j,t}$		-0.207		-0.136		-0.183		-0.322		-0.877
		(0.592)		(0.757)		(0.760)		(0.610)		(0.174)
Obs.	90	82	90	82	90	82	90	82	90	82

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCE) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.

5. Robustness checks

In this section, we undertake several robustness checks to confirm the reliability of our results. We account for an alternative sentiment measure, investigate the possible preferential treatment received by IMF's main shareholders and control for major macroeconomic announcements from the US Federal Reserve and the European Central Bank (ECB).

5.1. Using an alternative normalization

It is not clear whether the sentiment measure used above, $T_{i,t}$, accurately captures a report's sentiment. To address this potential bias, we examine the robustness of our results to the use of an alternative sentiment measure. This alternative measure, $T_{i,t}^{alt}$, consists in subtracting the share of positive words from the share of negative words over the total number of words:

$$T_{i,t}^{alt} = \frac{Pos_{i,t} - Neg_{i,t}}{Total_{i,t}}; \quad (5)$$

A higher index stands for a more positive IMF sentiment about the economic condition of a given country i in the REO report published at a particular time t . This alternative measure is also standardized to adjust for changes in the distribution of words that convey the sentiment across different reports. Its evolution, along with $t_{i,t}$, is displayed in Figures B.1, B.2, and B.3 in the Appendix. We observe that this new measure $t_{i,t}^{alt}$, on average, follows the evolution of $t_{i,t}$ but may lead to more or less significant sentiment anomalies depending on particular countries and periods.

We replace the initial sentiment measure with the one computed in 5 in the baseline specification (Eq. (3)) and in the augmented regression that includes IMF sentiment towards each country's main trading partner (i.e., Eq. (4)):

$$r_{i,t+h} - r_{i,t-1} = \mu_i + \alpha_1^{h,alt} \Delta T_{i,t}^{alt} + \alpha_2^{h,alt} IMF_{i,t} + \alpha_3^{h,alt} \left(\Delta T_{i,t}^{h,alt} \times IMF_{i,t} \right) + \beta_1^{h,alt} \Delta g_{i,t}^f + \beta_2^{h,alt} \Delta \pi_{i,t}^f + \epsilon_{i,t}; \quad (6)$$

$$r_{i,t+h} - r_{i,t-1} = \mu_i + \alpha_1^{h,alt} \Delta T_{i,t}^{alt} + \alpha_2^{h,alt} IMF_{i,t} + \alpha_3^{h,alt} \left(\Delta T_{i,t}^{h,alt} \times IMF_{i,t} \right) + \beta_1^{h,alt} \Delta g_{i,t}^f + \beta_2^{h,alt} \Delta \pi_{i,t}^f + \beta_3^{h,alt} \Delta T_{j,t}^{alt} + \epsilon_{i,t}; \quad (7)$$

Tables C.1 and C.2 in Appendix C report the estimation results. Our main findings

about the informational content of the sentiment index remain unchanged. The results confirm that a positive change in the new index is associated with a decrease in the 5-year and 10-year bond yields in *Asia and the Pacific*. In this region, IMF sentiment towards the main trading partner also has a significant relationship with domestic bond markets. In *Europe*, we still find a positive and significant relationship between bond yields and the new sentiment index, except for the 5-year yields in countries under an IMF program. IMF programs are also significantly associated with the 10-year bond yields in European markets. Finally, the results for the *Western Hemisphere* region are also similar to those of the baseline specification and the augmented regression including IMF sentiment towards the main trading partner of each country. A more positive IMF sentiment is associated with an increase in 5-year bond yields, except for countries under an IMF program where yields decrease. The 10-year bond yields in this region are only affected by the inflation forecasts in the REO reports.

5.2. Investigating the possible preferential treatment received by main IMF shareholders

Dreher et al. (2008) have pointed out that the IMF tends to deliver more optimistic forecasts to countries that have a great and direct influence within the organization. This suggests that there may be an additional asymmetric effect in the policy transmission channel that we need to test for.

To address this issue, we identify the largest shareholders among our sample countries and for each geographical region. We use the member countries' quota shares, which determine their voting power in IMF decisions, as our selection criterion.²¹ Based on this criterion, we select the United States as the largest shareholder for the *Western Hemisphere* region, China and Japan for *Asia and the Pacific*, and Germany, France, and the United Kingdom for *Europe* (See Table C.3 in Appendix C). We create a new dummy variable, $quota_i$, which is equal to "1" if country i is an IMF main shareholder and "0" otherwise. We also include an interaction term between this dummy variable and the sentiment variable to test whether changes in IMF sentiment have a different effect on bond returns for the main IMF shareholders. We add these two terms to our

²¹The IMF is funded by a quota system where each country pays based on the size of its economy and its political importance in world trade and finance. More specifically, IMF quotas are distributed according to a four-pronged formula that considers a member country's GDP, its economic openness, its economic variability and international reserves.

baseline equation, Eq. (3):

$$r_{i,t+h} - r_{i,t-1} = \mu_i + \alpha_1^h \Delta T_{i,t} + \alpha_2^h IMF_{i,t} + \alpha_3^h (\Delta T_{i,t} \times IMF_{i,t}) + \beta_1^h \Delta g_{i,t}^f + \beta_2^h \Delta \pi_{i,t}^f + \gamma_1^h quota_i + \gamma_2^h (\Delta T_{i,t} \times quota_i) + \epsilon_{i,t}; \quad (8)$$

where $quota_i = 1$ if the country i is an IMF main shareholder, and 0 otherwise.

Table C.4 in Appendix C shows the results of estimating Eq. (8). Among the three geographical regions, we find evidence of an additional effect in the policy transmission channel only for the Western Hemisphere. The coefficient on the interaction term is statistically significant and negative, indicating that changes in IMF sentiment towards the main shareholder in this region (the United States) have a significant relationship with the 5-year bond yields. This suggests that the IMF may give preferential treatment to this country. However, accounting for this additional effect does not change our previous conclusions.

5.3. Controlling for the Fed and the ECB monetary policy announcements

Monetary policy announcements by major central banks, such as the US Federal Reserve (Fed) and the European Central Bank (ECB), can trigger significant market reactions (Gürkaynak et al., 2005; Altavilla et al., 2019). As a result, there might be confounding effects if an IMF REO report is released on the same day as a monetary policy announcement by a central bank. Following this line of thought, we find that for six REO reports, there was a monetary policy announcement made by either the Fed or the ECB during the time windows considered in our empirical strategy. Specifically, for the Fed, (i) 1 announcement was made the day of the release of a REO, (ii) 2 announcements were made one day after and (iii) 3 two days after.²² For the ECB, (i) 2 announcements were made one day after the release of a REO, (ii) 3 two days after and (iii) 1 four days after.²³

To account for the potential confounding effects of monetary policy announcements, we add a dummy variable to Eq (3) that is equal to “1” when there is an announce-

²²The Fed major announcements made during the time windows considered correspond to the following dates: (i) October 12th 2012, (ii) April 28th 2010, April 27th 2011, and (iii) April 25th 2012, May 1st 2013, April 30th 2014, respectively.

²³The ECB major announcements made during the time windows considered correspond to the following dates: (i) April 12th 2007, April 10th 2008, (ii) May 04th 2006, May 7th 2009 and (iii) May 2nd 2013.

ment by the Fed or the ECB and “0” otherwise. Our results, shown in Table C.5 in Appendix C, are similar to our baseline findings for all regions and for both 5-year and 10-year government bond yields. This suggests that even though there are some major monetary policy announcements around the day a REO report is published, the IMF’s communication triggers changes in bond yields beyond central bank communication.

6. Conclusion

The effect of communication from international organizations like the IMF on financial markets has not been widely studied in the literature. In this paper, we use the General Inquiry dictionary to compute a sentiment index based on the text from the Regional Economic Outlook (REO) reports published by the IMF. The IMF sentiment is supposed to signal the staff’s views on a country’s economic and financial health as well as the sustainability of its economic policies; as such, it can thus be interpreted by investors as signaling more optimism or pessimism. We, therefore, test whether the qualitative content of the REO reports, as captured by the IMF sentiment index, influences the domestic bond markets of 16 countries from three regions, *Asia and Pacific*, *Europe*, and *Western Hemisphere*, between 2005 and 2018.

Our findings suggest that the qualitative content of the REO reports may have significant repercussions on bond markets. However, there are clear differences across regions. In *Europe* and the *Western Hemisphere*, a positive sentiment from the IMF is associated with higher bond yields. In contrast, in *Asia and the Pacific*, a positive sentiment from the IMF is associated with lower bond yields. A key finding is that financial markets seem to recognize and favorably respond to IMF sentiment towards countries involved in IMF programs. We observe these effects while we control for the IMF’s quantitative forecasts. Equally important, bond markets in the *Asia and Pacific* region seem to gradually incorporate the information embedded in the IMF reports of the region’s leading trading partner several days after the REO reports’ release. These findings hold true even when using an alternative sentiment measure and accounting for some other important determinants of bond yields, such as the role of main IMF shareholders and major macroeconomic announcements from the US Federal Reserve and the European Central Bank.

Our results, taken together, confirm the existence of a sentiment effect, through which the sentiment expressed by the IMF in its REO reports affects bond returns. They lend

further credence to the view that IMF sentiment contains price-relevant information for market participants by capturing how the international organization shapes its judgment about the economic conditions and policies of its member countries.

References

- Altavilla, C., Brugnolini, L., Gürkaynak, R.S., Motto, R., Ragusa, G., 2019. Measuring euro area monetary policy. *Journal of Monetary Economics* 108, 162–179.
- Anderson, G., Galang, P., Gamba, A., Medina, L., Zheng, T., 2021. How Have IMF Priorities Evolved? A Text Mining Approach. IMF Working Papers 21/159, Washington DC: International Monetary Fund.
- Batchelor, R., 2001. How useful are the forecasts of intergovernmental agencies? The IMF and OECD versus the consensus. *Applied Economics* 33, 225–235.
- Beck, N., Katz, J.N., 1995. What to do (and not to do) with Time-Series Cross-Section Data. *American Political Science Review* 89, 634–647.
- Boin, A., Stern, E., Sundelius, B., et al., 2016. *The politics of crisis management: Public leadership under pressure*. Cambridge University Press.
- Bollerslev, T., 1986. Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics* 31, 307–327.
- Brealey, R.A., Kaplanis, E., 2004. The impact of IMF programs on asset values. *Journal of International Money and Finance* 23, 253–270.
- Breen, M., Hodson, D., Moschella, M., 2019. Incoherence in Regime Complexes: A Sentiment Analysis of EU-IMF Surveillance. *Journal of Common Market Studies* 58, 419–437.
- Dreher, A., Marchesi, S., Vreeland, J.R., 2008. The political economy of IMF forecasts. *Public Choice* 137, 145–171.
- Evans, M.D., Lyons, R.K., 2005. Do currency markets absorb news quickly? *Journal of International Money and Finance* 24, 197–217.
- Frankel, J., Schreger, J., 2013. Over-optimistic official forecasts and fiscal rules in the Eurozone. *Review of World Economics* 149, 247–272.
- Fratzscher, M., Reynaud, J., 2011. IMF surveillance and financial markets—A political economy analysis. *European Journal of Political Economy* 27, 405–422.
- Ganapolsky, E.J., Schmukler, S.L., 1998. *The Impact of Policy Announcements and News on Capital Markets: Crisis Management in Argentina During the Tequila Effect*. Working Paper 5, Washington DC: World Bank.

- Gürkaynak, R.S., Sack, B., Swanson, E., 2005. The sensitivity of long-term interest rates to economic news: Evidence and implications for macroeconomic models. *American economic review* 95, 425–436.
- Hallerberg, M., Strauch, R.R., Von Hagen, J., 2009. *Fiscal governance in Europe*. Cambridge University Press.
- Hausman, J.A., 1978. Specification Tests in Econometrics. *Econometrica* 46, 1251–1271.
- Hayo, B., Kutan, A.M., 2005. The impact of news, oil prices, and global market developments on Russian financial markets. *Economics of Transition* 13, 373–393.
- Jaramillo, L., Weber, A., 2013. Bond yields in emerging economies: It matters what state you are in. *Emerging Markets Review* 17, 169–185.
- Javed, F., Mantalos, P., 2013. GARCH-Type Models and Performance of Information Criteria. *Communications in Statistics-Simulation and Computation* 42, 1917–1933.
- Jonung, L., Larch, M., 2006. Improving fiscal policy in the EU: the case for independent forecasts. *Economic Policy* 21, 492–534.
- Kutan, A.M., Muradoglu, G., Sudjana, B.G., 2012. IMF programs, financial and real sector performance, and the Asian crisis. *Journal of Banking & Finance* 36, 164–182.
- Lombardi, D., Woods, N., 2008. The politics of influence: An analysis of IMF surveillance. *Review of International Political Economy* 15, 711–739.
- Loughran, T., McDonald, B., 2011. When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *The Journal of Finance* 66, 35–65.
- Loughran, T., McDonald, B., 2020. *Textual Analysis in Finance*. *Annual Review of Financial Economics* 12, 357–375.
- Marinheiro, C.F., 2011. Fiscal sustainability and the accuracy of macroeconomic forecasts: Do supranational forecasts rather than government forecasts make a difference? *International Journal of Sustainable Economy* 3, 185–209.
- Mihalyi, D., Mate, A., 2019. *Text-Mining IMF Country Reports—An Original Dataset*. Available at SSRN 3268934 .
- Schmeling, M., Wagner, C., 2019. Does Central Bank Tone Move Asset Prices? CEPR Discussion Paper 13490, London: Centre for Economic Policy Research.

Svirydenka, K., 2016. Introducing a New Broad-based Index of Financial Development. IMF Working Papers 16/5, Washington DC: International Monetary Fund.

Twedt, B., Rees, L., 2012. Reading between the lines: An empirical examination of qualitative attributes of financial analysts' reports. *Journal of Accounting and Public Policy* 31, 1–21.

Appendix A

Table A.1: Number of reports published by the IMF (2000-2016)

Report	2000	2004	2008	2012	2016
World Economic Outlook	2	2	5	4	4
Regional Economic Outlook	0	2	10	8	10
Global Financial Stability report	0	1	2	2	2
Fiscal Monitor	0	0	0	4	2
Total	2	5	17	18	18

Figure A.1: Geographical coverage of the REO reports

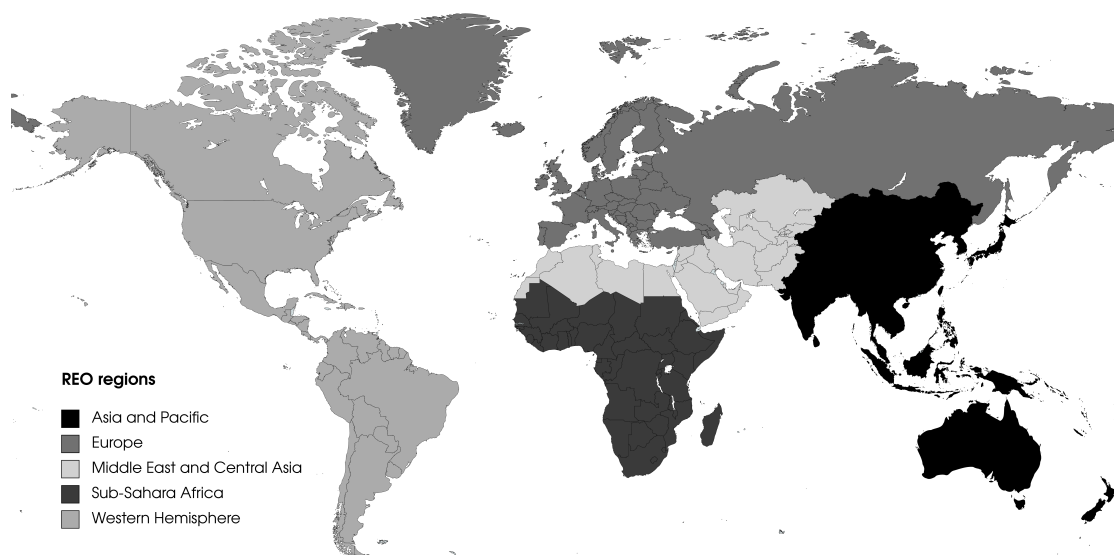


Table A.2: Summary statistics – Number of times a country is cited in the REO reports

<i>Asia and Pacific</i>								
Countries	Number of reports	Mean	Std	Min	25%	50%	75%	Max
Australia	27	40.3	27.2	6	18.5	36.0	52.5	106
China	27	155.2	114.0	18	87.0	142.0	209	600
India	27	70.9	40.7	13	37.5	71.0	96.5	148
Indonesia	27	54.4	34.0	10	28.0	46.0	80.0	114
Japan	27	82.2	52.2	10	37.0	77.0	130.0	173
Philippines	27	45.9	30.2	8	23.0	42.0	57.5	112
Singapore	27	42.0	26.6	4	19.0	42.0	56.5	97
South Korea	27	63.2	38.0	9	38.5	63.0	93.5	151
Taiwan	27	30.7	18.4	2	17.0	33.0	40.0	67
Thailand	27	49.5	30.6	8	26.0	46.0	63.5	116
<i>Europe</i>								
Countries	Number of reports	Mean	Std	Min	25%	50%	75%	Max
France	22	16.9	26.7	0	2.0	7.0	17.8	95
Germany	22	24.4	36.5	2	3.0	7.5	30.5	129
Greece	22	18.9	32.0	0	2.0	7.0	20.5	116
Italy	22	20.0	31.8	0	2.3	8.0	23.5	135
Netherlands	22	15.7	28.8	0	1.0	5.0	14.3	125
Poland	22	43.0	28.0	5	27.0	34.5	53.5	115
Russia	22	42.9	25.5	3	26.5	37.5	62.5	93
Spain	22	22.2	37.4	0	1.3	8.5	28.8	145
Switzerland	22	8.5	15.4	0	1.0	4.5	10.8	73
Turkey	22	41.5	29.3	0	19.5	37.5	67.0	95
United-Kingdom	22	21.3	27.3	0	2.0	12.0	31.5	113
<i>Western Hemisphere</i>								
Countries	Number of reports	Mean	Std	Min	25%	50%	75%	Max
Argentina	26	31.8	21.3	5	16.5	28.5	35.0	92
Brazil	26	64.6	36.3	15	28.3	68.5	93.5	132
Canada	26	20.3	18.2	1	6.0	15.0	29.8	59
Chile	26	54.8	30.2	12	28.5	56.5	79.0	110
Colombia	26	49.9	28.4	12	23.0	49.4	63.5	104
Ecuador	26	16.5	10.1	5	9.0	13.5	20.0	44
Mexico	26	62.3	32.3	14	34.0	65.0	85.8	133
Peru	26	49.9	26.9	12	26.3	46.5	70.0	105
United-States	26	43.5	29.5	6	24.0	47.5	56.0	148
Venezuela	26	22.7	12.5	6	14.0	19.0	30.5	50

Note: this table displays the number of reports, the mean, the standard deviation, the minimum, the maximum and the 25%, 50%, and 75% quantiles for the number of times a country is identified in the REO reports.

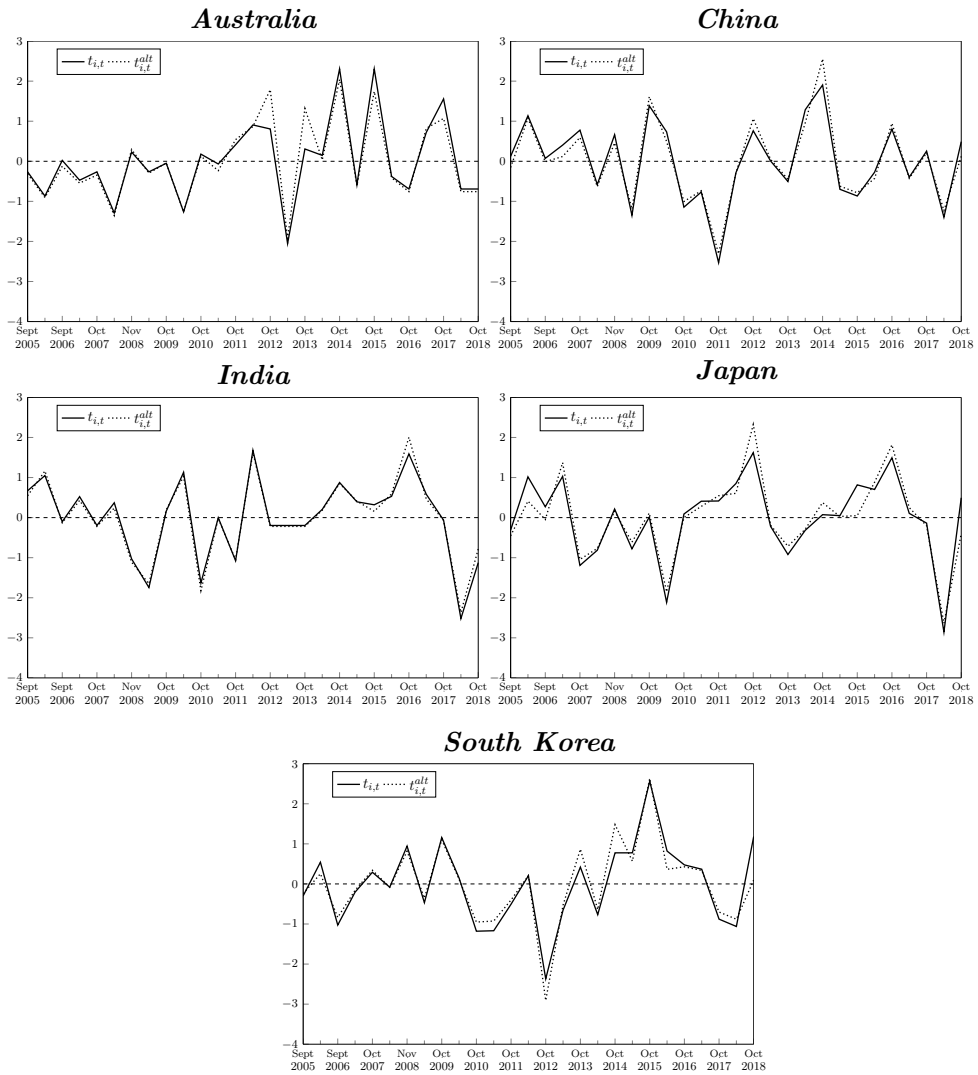
Appendix B

Table B.1: Share of sentiment words (in % of the total number of words)

<i>Asia and Pacific</i>								
	Share of positive words				Share of negative words			
Countries	Mean	Std	Min	Max	Mean	Std	Min	Max
Australia	6.84	3.01	0.00	14.81	4.13	2.01	0.00	7.41
China	6.74	1.45	5.05	11.11	4.60	0.91	3.38	7.30
India	5.79	2.02	0.00	9.85	5.25	1.77	0.00	8.35
Japan	7.16	1.89	3.30	11.49	5.38	1.41	2.20	8.43
South Korea	6.65	2.11	3.25	12.50	5.01	2.15	1.30	12.96
<i>Europe</i>								
	Share of positive words				Share of negative words			
Countries	Mean	Std	Min	Max	Mean	Std	Min	Max
France	2.95	3.71	0.00	12.12	2.14	2.85	0.00	9.09
Germany	5.00	4.38	0.00	17.65	3.26	2.65	0.00	7.69
Poland	7.59	3.77	0.00	18.18	4.48	2.96	0.00	13.16
Russia	5.93	2.96	0.00	12.50	6.29	4.31	0.00	21.05
Turkey	5.60	2.73	0.00	9.68	4.32	2.86	0.00	10.61
United Kingdom	2.78	2.54	0.00	6.50	3.68	3.23	0.00	9.09
<i>Western Hemisphere</i>								
	Share of positive words				Share of negative words			
Countries	Mean	Std	Min	Max	Mean	Std	Min	Max
Argentina	6.13	3.00	2.41	14.81	4.25	2.46	0.00	7.81
Brazil	5.84	1.47	3.49	8.44	4.82	1.20	2.97	7.59
Canada	4.86	2.80	0.00	9.09	3.70	2.51	0.00	8.00
Mexico	5.92	1.88	0.00	8.90	4.12	2.08	0.00	11.18
United States	5.75	1.31	3.00	7.92	4.87	1.56	1.00	9.55

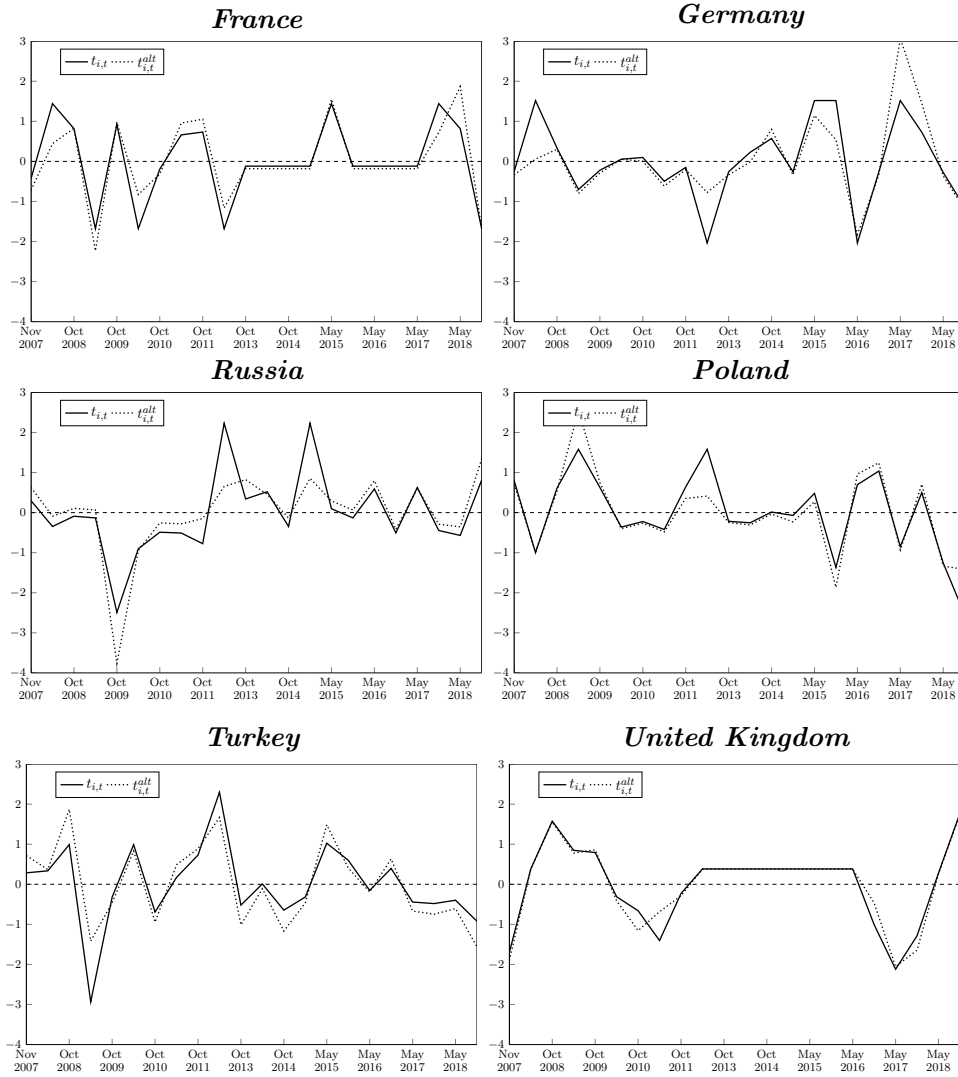
Note: std, min and max stand respectively for standard deviation, minimum and maximum. this table reports, for each country, descriptive statistics for the share of positive and negative words, as a percentage of all distinct words included in the REO reports.

Figure B.1: IMF Sentiment towards each country, Asia and Pacific



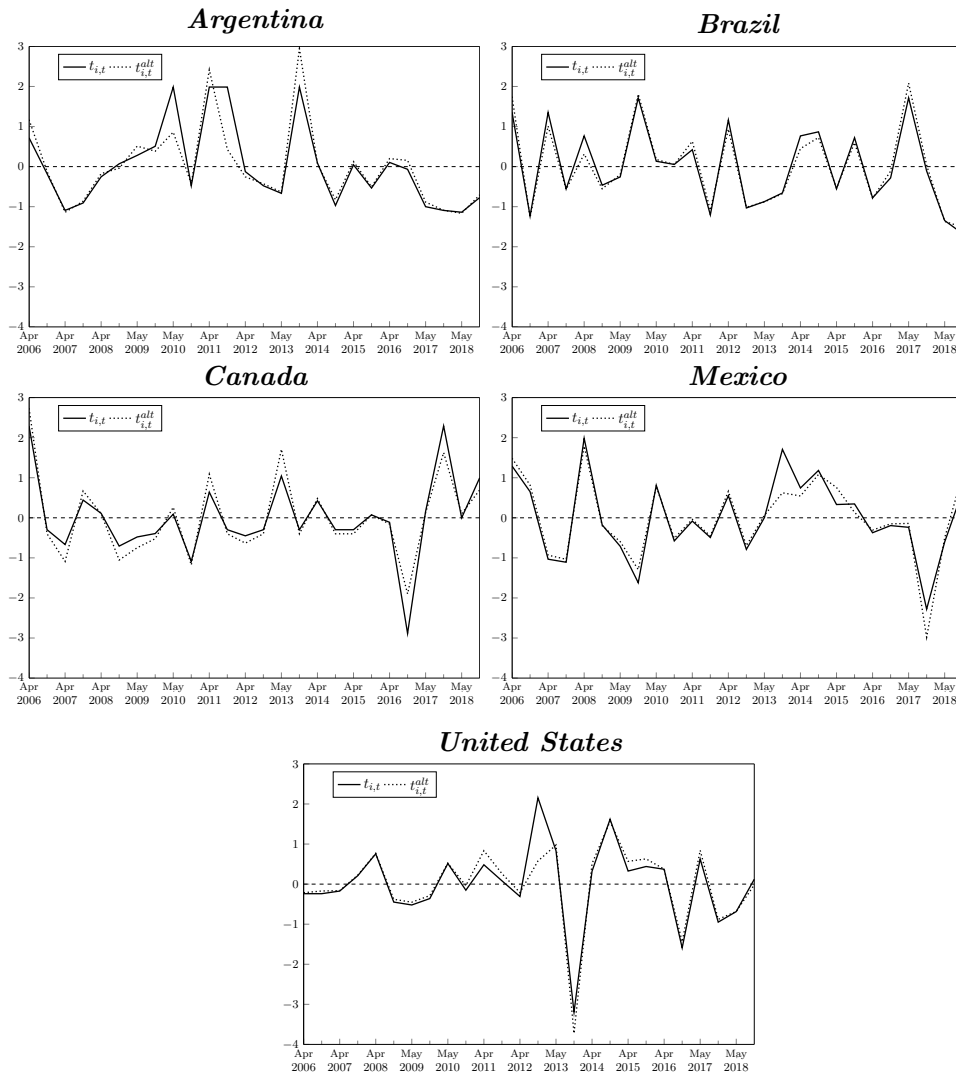
Note: The figures show the evolution of Z-score for each sentiment index – $t_{i,t}$ (solid line), $t_{i,t}^{alt}$ (dotted line) – and for each selected country within the Asia and Pacific region.

Figure B.2: IMF Sentiment towards each country, Europe



Note: The figures show the evolution of Z-score for each sentiment index – $t_{i,t}$ (solid line), $t_{i,t}^{alt}$ (dotted line) – and for each selected country within the Europe region.

Figure B.3: IMF Sentiment towards each country, Western Hemisphere



Note: The figures show the evolution of Z-score for each sentiment index – $t_{i,t}$ (solid line), $t_{i,t}^{alt}$ (dotted line) – and for each selected country within the Western Hemisphere region.

Table B.2: Main trading partners

<i>Asia and Pacific</i>			
Countries	First position	Second position	Third position
Australia	China*	Japan	South Korea
China	United States	Japan*	South Korea
India	China*	United States	United Arab Emirates
Japan	China*	United States	South Korea
South Korea	China*	Japan	Vietnam
<i>Europe</i>			
Countries	First position	Second position	Third position
France	Germany*	United States	Spain
Germany	United States	France*	China
Poland	Germany*	China	Russia
Russia	China	Germany*	Netherlands
Turkey	Germany*	United Kingdom	Italy
United Kingdom	United States	Germany*	Netherlands
<i>Western Hemisphere</i>			
Countries	First position	Second position	Third position
Argentina	Brazil*	China	United States
Brazil	China	United States*	Argentina
Canada	United States*	China	United Kingdom
Mexico	United States*	China	Canada
United States	Canada*	Mexico	China

Note: Within each region, a specific country plays an hegemonic role in the regional trade: Germany for Europe, the United States for Western Hemisphere, and China for Asia and Pacific. For each country, we select the hegemonic country to test whether its sentiment index alters the financial markets of the other countries, except for Argentina. For the three hegemonic countries, we select the main regional trading partner, that is Japan for China, France for Germany, Canada for the United States. For each country, the selected main regional trade partner is marked with an asterisk.

Source: Authors' calculation based on the World Integrated Trade Solution (WITS) dataset.

Appendix C

Table C.1: Testing the effect of changes in the IMF sentiment on cumulative changes in 5-year bond yields, using an alternative sentiment measure

<i>Asia and Pacific</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}					
$\Delta T_{i,t}^{alt}$	-6.553*	-3.731	-6.492	-0.939	-6.655	-1.495	-6.090	-3.467	-7.174	-2.301
	(0.060)	(0.301)	(0.204)	(0.859)	(0.171)	(0.759)	(0.339)	(0.599)	(0.347)	(0.769)
$\Delta g_{i,t}^f$	0.0699	0.0659	0.0961	0.104	-0.0194	-0.0351	-0.205	-0.204	-0.0628	-0.0440
	(0.441)	(0.449)	(0.509)	(0.444)	(0.874)	(0.766)	(0.176)	(0.183)	(0.763)	(0.831)
$\Delta T_{j,t}^{alt}$		-9.707**		-18.68***		-17.02***		-9.143		-16.03
		(0.034)		(0.009)		(0.008)		(0.272)		(0.126)
Obs.	102	102	102	102	102	102	102	102	102	102
<i>Europe</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}					
$\Delta T_{i,t}^{alt}$	6.563**	7.122**	10.94***	12.58***	14.50**	16.37***	15.06**	16.95**	15.82**	17.58**
	(0.016)	(0.013)	(0.006)	(0.002)	(0.014)	(0.008)	(0.016)	(0.010)	(0.012)	(0.011)
$IMF_{i,t}$	-0.491*	-0.404	-0.773	-0.619	-0.750	-0.770	-0.454	-0.169	-0.566	-0.249
	(0.071)	(0.156)	(0.187)	(0.351)	(0.538)	(0.576)	(0.734)	(0.910)	(0.633)	(0.857)
$\Delta T_{i,t}^{alt} \times IMF_{i,t}$	-10.96***	-14.69***	-7.945	-15.92**	-14.33	-21.16	-20.32	-23.14*	-19.04	-22.50
	(0.002)	(0.000)	(0.241)	(0.036)	(0.277)	(0.139)	(0.116)	(0.100)	(0.133)	(0.100)
$\Delta g_{i,t}^f$	0.00803	0.00299	0.171	0.135	0.128	0.108	0.0536	-0.0380	0.0993	-0.0261
	(0.904)	(0.966)	(0.184)	(0.307)	(0.535)	(0.616)	(0.799)	(0.863)	(0.643)	(0.910)
$\Delta \pi_{i,t}^f$	0.0217	0.0250	0.0460	0.0496	0.0105	0.0190	-0.0611	-0.112	0.0673	-0.0451
	(0.773)	(0.743)	(0.737)	(0.732)	(0.958)	(0.930)	(0.756)	(0.603)	(0.731)	(0.840)
$\Delta T_{j,t}^{alt}$		0.477		0.715		-0.0686		9.070		15.20*
		(0.875)		(0.867)		(0.993)		(0.310)		(0.082)
Obs.	56	52	56	52	56	52	56	52	56	52
<i>Western Hemisphere</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}					
$\Delta T_{i,t}^{alt}$	19.12***	32.06***	18.68**	31.20***	19.66**	34.70***	21.41**	37.73***	21.77**	36.82***
	(0.001)	(0.000)	(0.011)	(0.000)	(0.024)	(0.001)	(0.011)	(0.000)	(0.015)	(0.000)
$IMF_{i,t}$	-0.536**	-0.549*	-0.762**	-0.699*	-0.834*	-0.848*	-0.863**	-0.914**	-0.998**	-1.031**
	(0.048)	(0.073)	(0.031)	(0.063)	(0.054)	(0.063)	(0.031)	(0.035)	(0.031)	(0.037)
$\Delta T_{i,t}^{alt} \times IMF_{i,t}$	-29.12***	-41.64***	-38.03***	-50.68***	-33.09**	-48.61***	-30.79**	-47.09***	-31.01**	-44.72**
	(0.001)	(0.000)	(0.001)	(0.000)	(0.024)	(0.004)	(0.021)	(0.003)	(0.042)	(0.010)
$\Delta g_{i,t}^f$	0.0714	0.0548	0.0477	0.0384	-0.00214	-0.0334	0.0351	0.00760	-0.00989	-0.0471
	(0.615)	(0.700)	(0.745)	(0.797)	(0.990)	(0.847)	(0.830)	(0.964)	(0.958)	(0.804)
$\Delta \pi_{i,t}^f$	0.650***	0.775***	0.795***	0.939***	0.977***	1.171***	0.957***	1.172***	0.774***	1.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)
$\Delta T_{j,t}^{alt}$		-10.82*		-9.919		-10.17		-10.56		-13.99*
		(0.063)		(0.141)		(0.236)		(0.189)		(0.086)
Obs.	92	84	92	84	92	84	92	84	92	84

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCE) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.

Table C.2: Testing the effect of changes in the IMF sentiment on cumulative changes in 10-year bond yields, using an alternative sentiment measure

<i>Asia and Pacific</i>										
	i_t^{10y}		i_{t+1}^{10y}		i_{t+2}^{10y}		i_{t+3}^{10y}		i_{t+4}^{10y}	
$\Delta T_{i,t}^{alt}$	-6.524***	-4.526**	-5.826	0.527	-8.765*	-1.746	-9.483	-5.096	-12.63*	-5.347
	(0.004)	(0.047)	(0.153)	(0.891)	(0.055)	(0.697)	(0.103)	(0.386)	(0.073)	(0.438)
$\Delta g_{i,t}^f$	0.0111	0.0137	0.0542	0.0774	-0.0198	-0.0416	-0.156	-0.169	-0.152	-0.148
	(0.859)	(0.820)	(0.668)	(0.497)	(0.872)	(0.710)	(0.273)	(0.235)	(0.424)	(0.417)
$\Delta T_{j,t}^{alt}$		-6.109**		-20.32***		-22.21***		-15.61**		-25.82***
		(0.048)		(0.000)		(0.000)		(0.037)		(0.005)
Obs.	102	102	102	102	102	102	102	102	102	102
<i>Europe</i>										
	i_t^{10y}		i_{t+1}^{10y}		i_{t+2}^{10y}		i_{t+3}^{10y}		i_{t+4}^{10y}	
$\Delta T_{i,t}^{alt}$	1.017	1.187	4.567	5.522	10.49*	11.88**	9.885*	11.43*	15.04***	16.56***
	(0.610)	(0.586)	(0.229)	(0.166)	(0.050)	(0.035)	(0.097)	(0.071)	(0.002)	(0.003)
$IMF_{i,t}$	-0.887***	-0.733**	-1.195***	-0.989***	-1.105	-1.026	-0.670	-0.544	-1.190	-0.797
	(0.002)	(0.013)	(0.000)	(0.007)	(0.185)	(0.287)	(0.447)	(0.603)	(0.215)	(0.463)
$\Delta T_{i,t}^{alt} \times IMF_{i,t}$	-2.511	-5.216	-4.090	-8.908**	-10.37	-14.83*	-14.44*	-14.03*	-18.28**	-20.50**
	(0.423)	(0.113)	(0.349)	(0.026)	(0.206)	(0.077)	(0.064)	(0.082)	(0.026)	(0.025)
$\Delta g_{i,t}^f$	-0.00668	-0.0136	0.0893	0.0743	0.109	0.0784	0.0559	-0.0295	0.119	0.0293
	(0.904)	(0.809)	(0.174)	(0.323)	(0.403)	(0.586)	(0.727)	(0.865)	(0.444)	(0.860)
$\Delta \pi_{i,t}^f$	0.00614	0.00568	0.0369	0.0324	0.109	0.0908	-0.0365	-0.0941	0.0931	0.0114
	(0.893)	(0.908)	(0.650)	(0.693)	(0.401)	(0.508)	(0.815)	(0.563)	(0.441)	(0.932)
$\Delta T_{j,t}^{alt}$		0.684		1.132		2.541		9.189		11.43
		(0.780)		(0.786)		(0.698)		(0.258)		(0.175)
Obs.	56	52	56	52	56	52	56	52	56	52
<i>Western Hemisphere</i>										
	i_t^{10y}		i_{t+1}^{10y}		i_{t+2}^{10y}		i_{t+3}^{10y}		i_{t+4}^{10y}	
$\Delta T_{i,t}^{alt}$	-4.964	-2.985	-3.962	-1.852	-3.765	0.926	-2.914	2.735	-0.0477	4.510
	(0.292)	(0.614)	(0.504)	(0.790)	(0.626)	(0.917)	(0.711)	(0.770)	(0.995)	(0.640)
$IMF_{i,t}$	0.269	0.306	0.0399	0.101	0.00797	0.0510	0.165	0.164	0.307	0.318
	(0.358)	(0.297)	(0.907)	(0.770)	(0.987)	(0.917)	(0.728)	(0.726)	(0.566)	(0.547)
$\Delta T_{i,t}^{alt} \times IMF_{i,t}$	-4.312	-6.328	-16.11	-18.06	-7.892	-12.39	-8.472	-13.99	-11.40	-15.00
	(0.596)	(0.483)	(0.159)	(0.134)	(0.599)	(0.431)	(0.582)	(0.391)	(0.428)	(0.330)
$\Delta g_{i,t}^f$	0.0838	0.0642	-0.0242	-0.0328	-0.0660	-0.0962	-0.0592	-0.0911	-0.0894	-0.136
	(0.453)	(0.563)	(0.823)	(0.761)	(0.672)	(0.531)	(0.714)	(0.564)	(0.648)	(0.478)
$\Delta \pi_{i,t}^f$	0.322**	0.390**	0.301	0.358*	0.324	0.451*	0.337	0.471*	0.258	0.445
	(0.047)	(0.022)	(0.121)	(0.078)	(0.213)	(0.094)	(0.204)	(0.086)	(0.352)	(0.125)
$\Delta T_{j,t}^{alt}$		-2.308		-2.142		-1.775		-3.412		-8.310
		(0.656)		(0.684)		(0.806)		(0.663)		(0.289)
Obs.	92	84	92	84	92	84	92	84	92	84

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCE) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.

Table C.3: Quota shares

<i>Asia and Pacific</i>		
Countries	Millions of SDRs	Percent of total
Australia	6,572.4	1.38
China*	30,482.9	6.40
India	13,114.4	2.75
Japan*	30,820.5	6.47
South Korea	8,582.7	1.80
<i>Europe</i>		
Countries	Millions of SDRs	Percent of total
France*	20,155.1	4.23
Germany*	26,634.4	5.59
Russia	12,903.7	2.71
Turkey	4,658.6	0.98
United Kingdom*	20,155.1	4.23
<i>Western Hemisphere</i>		
Countries	Millions of SDRs	Percent of total
Argentina	3,187.3	0.67
Brazil	11,042	2.32
Canada	11,023.9	2.31
Mexico	8,912.7	1.87
United States*	82,994.2	17.43

Note: countries with an asterisk are considered main IMF shareholders.
Source: <https://www.imf.org/en/About/executive-board/members-quotas>

Table C.4: Testing the effect of changes in the IMF sentiment on cumulative changes in 5-year and 10-year bond yields, investigating the role of main IMF shareholders

<i>Asia and Pacific</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	-0.240** (-2.05)	-0.231 (-1.17)	-0.297* (-1.74)	-0.515** (-2.49)	-0.632** (-2.53)	-0.211** (-2.47)	-0.128 (-0.78)	-0.366** (-2.02)	-0.577*** (-2.73)	-0.654** (-2.54)
$\Delta g_{i,t}^f$	0.0657 (0.66)	0.102 (0.65)	-0.0285 (-0.23)	-0.250* (-1.80)	-0.120 (-0.60)	0.0175 (0.27)	0.0590 (0.43)	-0.0160 (-0.12)	-0.173 (-1.26)	-0.167 (-0.85)
$quota_i$	0.0328 (0.18)	-0.342 (-1.09)	-0.138 (-0.34)	-0.171 (-0.32)	-0.481 (-0.61)	-0.109 (-1.02)	-0.183 (-0.93)	-0.153 (-0.68)	-0.0305 (-0.11)	-0.103 (-0.21)
$\Delta T_{i,t} \times quota_i$	0.187 (1.13)	0.172 (0.73)	0.267 (1.18)	0.733** (2.44)	0.885*** (2.66)	0.0613 (0.61)	-0.0349 (-0.18)	0.248 (1.15)	0.643** (2.43)	0.709** (2.14)
Obs.	100	100	100	100	100	113	113	113	113	113
<i>Europe</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	0.371** (2.49)	0.436** (2.51)	0.685*** (2.81)	0.708*** (2.72)	0.700*** (2.77)	0.0600 (0.60)	0.292* (1.75)	1.172*** (4.00)	0.869** (2.44)	0.943*** (3.24)
$IMF_{i,t}$	-0.336 (-0.85)	-1.824** (-2.44)	-3.625** (-2.46)	-3.520** (-2.34)	-3.628*** (-2.92)	0.108 (0.35)	-0.623 (-1.29)	-3.527*** (-3.55)	-2.717** (-2.51)	-3.180*** (-2.84)
$\Delta T_{i,t} \times IMF_{i,t}$	-0.612** (-2.40)	-0.118 (-0.23)	-0.447 (-0.47)	-1.071 (-1.16)	-0.906 (-1.07)	-0.112 (-0.69)	-0.200 (-0.79)	-1.068** (-2.03)	-1.379** (-2.39)	-1.270** (-2.19)
$\Delta g_{i,t}^f$	-0.0377 (-0.88)	0.0713 (0.80)	-0.0195 (-0.16)	-0.0621 (-0.48)	-0.0548 (-0.40)	-0.0127 (-0.28)	0.0578 (0.91)	0.0283 (0.30)	-0.0152 (-0.11)	0.0567 (0.40)
$\Delta \pi_{i,t}^f$	0.0778 (1.38)	0.0437 (0.53)	0.0534 (0.50)	0.00386 (0.04)	0.0604 (0.60)	0.0370 (0.97)	0.0995 (1.43)	0.244*** (2.81)	0.0672 (0.49)	0.171 (1.36)
$quota_i$	0.384* 0.323 (1.93)	0.136 (0.59)	-0.0777 (0.26)	0.518 (-0.12)	0.555*** (0.73)	0.424 (2.70)	0.200 (0.94)	0.0683 (0.36)	0.571 (0.10)	(0.89)
$\Delta T_{i,t} \times quota_i$	0.00663 (0.03)	0.202 (0.51)	0.267 (0.58)	0.417 (0.70)	0.593 (0.92)	0.269 (1.27)	0.261 (0.77)	-0.228 (-0.48)	0.234 (0.35)	0.331 (0.46)
Obs.	68	68	68	68	68	56	56	56	56	56
<i>Western Hemisphere</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	1.072*** (4.95)	1.074*** (5.20)	1.082*** (4.31)	1.148*** (4.63)	1.157*** (4.72)	-0.117 (-1.13)	-0.0944 (-0.90)	-0.0387 (-0.27)	-0.0276 (-0.18)	0.0216 (0.13)
$IMF_{i,t}$	-0.191 (-0.34)	-0.705 (-1.04)	-1.278* (-1.71)	-1.279* (-1.85)	-1.176 (-1.39)	-0.775* (-1.77)	-0.437 (-0.76)	-0.825 (-1.05)	-0.856 (-1.15)	-1.196 (-1.61)
$\Delta T_{i,t} \times IMF_{i,t}$	-1.443*** (-3.98)	-1.537*** (-3.78)	-1.343*** (-2.80)	-1.282*** (-2.97)	-1.427*** (-3.12)	-0.120 (-0.60)	-0.359 (-1.14)	-0.123 (-0.31)	-0.140 (-0.34)	-0.402 (-1.09)
$\Delta g_{i,t}^f$	0.00411 (0.03)	-0.0365 (-0.23)	-0.0834 (-0.47)	-0.0460 (-0.26)	-0.0950 (-0.47)	0.0930 (1.12)	-0.0267 (-0.34)	-0.0534 (-0.47)	-0.0700 (-0.56)	-0.127 (-0.83)
$\Delta \pi_{i,t}^f$	1.020*** (4.46)	1.122*** (4.59)	1.291*** (4.45)	1.296*** (4.50)	1.126*** (3.71)	0.0707*** (2.95)	0.0409** (1.99)	0.0457 (1.45)	0.0512 (1.33)	0.0831 (1.49)
$quota_i$	-0.145 (-0.89)	0.0539 (0.17)	0.201 (0.63)	0.289 (1.00)	0.206 (0.55)	-0.126 (-0.74)	0.0715 (0.26)	0.181 (0.57)	0.395 (1.41)	0.431 (1.19)
$\Delta T_{i,t} \times quota_i$	-1.074*** (-4.23)	-1.130*** (-3.76)	-1.247*** (-3.33)	-1.288*** (-3.54)	-1.199*** (-3.29)	0.0490 (0.31)	-0.00900 (-0.04)	-0.138 (-0.47)	-0.123 (-0.42)	-0.0722 (-0.24)
Obs.	90	90	90	90	90	113	113	113	113	113

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCF) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.

Table C.5: Testing the effect of changes in the IMF sentiment on cumulative changes in 5-year and 10-year bond yields, controlling for the Fed and the ECB monetary policy announcements

<i>Asia and Pacific</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	-0.137 (-1.55)	-0.136 (-1.08)	-0.144 (-1.18)	-0.107 (-0.68)	-0.0639 (-0.34)	-0.176*** (-3.48)	-0.149 (-1.43)	-0.220** (-2.10)	-0.233* (-1.71)	-0.245 (-1.38)
$\Delta g_{i,t}^f$	0.0676 (0.66)	0.0967 (0.61)	-0.0448 (-0.32)	-0.260 (-1.55)	-0.153 (-0.65)	0.0153 (0.24)	0.0542 (0.39)	0.0625 (0.45)	-0.144 (-0.91)	-0.113 (-0.51)
Obs.	100	100	100	100	100	100	100	100	100	100
<i>Europe</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	0.370*** (2.66)	0.506*** (2.94)	0.790*** (3.39)	0.862*** (3.00)	0.948*** (3.42)	0.194 (1.51)	0.420** (2.03)	1.011*** (3.46)	1.006*** (2.60)	1.198*** (3.20)
$IMF_{i,t}$	-0.335 (-0.86)	-1.838** (-2.32)	-3.612** (-2.44)	-3.525** (-2.40)	-3.746** (-2.96)	0.0682 (0.20)	-0.779 (-1.15)	-3.563*** (-2.92)	-2.878** (-2.41)	-3.085** (-2.48)
$\Delta T_{i,t} \times IMF_{i,t}$	-0.610** (-2.49)	-0.233 (-0.44)	-0.585 (-0.62)	-1.216 (-1.39)	-1.162 (-1.42)	-0.234 (-1.25)	-0.391 (-1.20)	-1.010* (-1.67)	-1.505** (-2.49)	-1.536** (-2.28)
$\Delta g_{i,t}^f$	-0.0437 (-0.99)	0.0620 (0.69)	-0.0288 (-0.23)	-0.0693 (-0.51)	-0.0843 (-0.59)	-0.0289 (-0.62)	0.0563 (1.06)	0.0439 (0.53)	-0.0268 (-0.20)	0.0233 (0.18)
$\Delta \pi_{i,t}^f$	0.0807 (1.43)	0.0545 (0.62)	0.0563 (0.50)	0.0124 (0.12)	0.0970 (0.86)	0.0630 (1.53)	0.142* (1.81)	0.246** (2.50)	0.104 (0.73)	0.199 (1.47)
Obs.	68	68	68	68	68	56	56	56	56	56
<i>Western Hemisphere</i>										
	i_t^{5y}	i_{t+1}^{5y}	i_{t+2}^{5y}	i_{t+3}^{5y}	i_{t+4}^{5y}	i_t^{10y}	i_{t+1}^{10y}	i_{t+2}^{10y}	i_{t+3}^{10y}	i_{t+4}^{10y}
$\Delta T_{i,t}$	0.692*** (5.22)	0.699*** (4.99)	0.660*** (3.62)	0.723*** (3.99)	0.725*** (4.07)	-0.108 (-1.26)	-0.0757 (-0.82)	-0.0750 (-0.57)	-0.0609 (-0.46)	0.00233 (0.02)
$IMF_{i,t}$	-0.0253 (-0.05)	-0.455 (-0.64)	-1.229* (-1.73)	-1.286** (-2.06)	-1.053 (-1.30)	-0.743 (-1.64)	-0.292 (-0.48)	-0.772 (-0.99)	-0.877 (-1.16)	-1.129 (-1.50)
$\Delta T_{i,t} \times IMF_{i,t}$	-1.040*** (-4.00)	-1.048*** (-3.00)	-0.900** (-2.17)	-0.822** (-2.33)	-0.981** (-2.41)	-0.141 (-0.71)	-0.361 (-1.13)	-0.107 (-0.26)	-0.0959 (-0.23)	-0.424 (-1.14)
$\Delta g_{i,t}^f$	-0.0135 (-0.10)	0.163 (1.06)	-0.0800 (-0.47)	-0.0536 (-0.32)	-0.127 (-0.70)	0.0804 (0.99)	0.0293 (0.34)	-0.0554 (-0.49)	-0.0754 (-0.60)	-0.129 (-0.87)
$\Delta \pi_{i,t}^f$	0.891*** (4.60)	1.082*** (5.02)	1.126*** (4.21)	1.128*** (4.26)	0.989*** (3.60)	0.0659*** (2.69)	0.0429* (1.92)	0.0435 (1.34)	0.0522 (1.35)	0.0834 (1.54)
Obs.	90	90	90	90	90	113	113	113	113	113

Note: Inflation forecasts are not reported in the REO reports of the Asian and Pacific region. Prais-Winsten (PSCE) estimates (Beck and Katz, 1995). ***, **, and * indicate respectively 1%, 5%, and 10% significance.