



Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimfUnobservable country bond premia and fragmentation [☆]

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ARTICLE INFO

Article history:

Available online 23 December 2017

JEL classification:

C33
F36
G15

Keywords:

Corporate credit spreads
Excess bond premium
Fragmentation

ABSTRACT

Using either yield-to-maturity spreads or asset swap spreads for 1900 Eurobonds across euro area non-financial industries, we estimate excess bond premia computed as the duration-adjusted credit spreads in excess of idiosyncratic risks and observable country risks. We find that financial market fragmentation, defined as the unobservable country risk heterogeneity, characterise the euro area corporate bond market. It increased sharply after Lehman's bankruptcy and during the sovereign debt crisis, despite the model controls for sovereign risk, interbank credit risk and the US VIX. An important driver of fragmentation during the hikes of the sovereign debt crisis was a higher price for credit and macro risks demanded by investors in one country compared to another country. There is evidence that fragmentation risk reverted its trend after Draghi's "whatever it takes" speech.

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1. Introduction

Over the course of 2011 and 2012, the euro area's financial system was strongly affected by a sharp increase in sovereign and corporate spreads in some euro area jurisdictions. Investors were dumping some euro assets and, in particular in the summer 2012, the monetary union itself looked to be on the verge of collapse. In that period, Italian and Spanish long-term sovereign and corporate yields relative to the euro area Overnight Index Swap (OIS),¹ a risk free rate measure, reached about 500 basis points. Therefore, speaking at a global investment conference on 26 July 2012, the president of the European Central Bank (ECB) Mario Draghi said "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough". Soon after the "whatever it takes" speech, the Eurosystem launched the outright monetary transactions (OMT) programme on 2 August 2012, under which the Eurosystem could make purchases ("outright transactions") in the secondary markets of sovereign bonds with a maturity of between one and three years. A necessary condition for OMTs is strict

[☆] The paper was presented at the Annual Meeting of the American Economic Association in Chicago 5–8 January 2017 and at ECB, Bank of England and Banca d'Italia internal seminar series. I would like to thank Gonzalo Camba-Méndez, Giancarlo Corsetti, Stefania D'Amico, Peter Karadi, Andrea Tiseno, Oreste Tristani, Philip Vermeulen and Egon Zakrajšek for very useful discussions and feedback. The views expressed in this paper are those of the author and do not necessarily reflect those of the European Central Bank or the Eurosystem.

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¹ An OIS is a financial contract between two counterparties to exchange a fixed interest rate against a geometric average of overnight interest rates (in the euro area, the EONIA) over the contractual life of the swap. Today there are two main types of euro-denominated interest rate swap, the main distinguishing feature of which is the exposure of the variable rate: (i) OIS, with a variable rate which is the average of the EONIA rates, and (ii) EURIBOR-based swaps, with a variable rate of one of the EURIBOR rates (e.g. the three-month or six-month EURIBOR). The appeal of interest rate swaps is that the user can easily manage interest rate risk. An important distinction from bonds is that swaps are non-investible, i.e. they do not serve as a store of value. Therefore, there is no initial payment and, on interest payment dates, the value of the swap only deviates from zero if the interest rate for the remaining time to maturity differs from the agreed fixed swap rate. The market for interest rate swaps is over the counter (OTC), but many maturities up to 30 years are quoted on various trading platforms, providing a reliable signal about market expectations regarding future EONIA rates.

and effective conditionality attached to an appropriate European Financial Stability Facility/European Stability Mechanism (EFSF/ESM) programme.

Financial market fragmentation was one key policy reason to announce the OMT programme. According to the ECB, financial fragmentation had created widely divergent borrowing costs for governments, firms and households across euro area countries, severely impairing the transmission of monetary policy (ECB, 2013).² After the speech, sovereign and corporate spreads started to decline and, by September 2012, the Italian and Spanish long-term spreads fell by about 150–200 basis points compared to the peak in July, and subsequently saw a further steady decline.

Even if some observers argue that during the recent sovereign debt crisis euro area financial markets suffered from fragmentation – especially when compared with the situation before the crisis; others would argue that the dispersion among countries' credit spreads was driven by fundamentals. The key issue is that convergence or differentiation across yields, in itself, is not sufficient evidence of market integration or fragmentation.³ Assessing the relative importance of credit risk is extremely important. If the dynamics of credit spreads is due to credit risk, then it is tolerable and desirable, because an increase in credit risk premia can force the management of an inefficient firm in the case of corporate bonds and the government in the case of sovereign bonds to undertake the needed structural reforms; otherwise, it is unwelcome.

We define market fragmentation following the price-based approach adopted by Baele et al. (2004), which captures discrepancies in asset prices across different national markets. According to the law of one price, assets with identical cash flow and risk characteristics should have the same price, independently of the location where they are traded.

Asset prices are not directly comparable across firms, as they are characterised by different cash flows and very heterogeneous sources of risk. Despite that, several papers used changes in equity returns dispersion to test the law of one price (see, for example, Solnik and Roulet, 2000, Adjaouté and Danthine, 2004, Byström, 2006). In contrast, Baele et al. (2004), Zaghini (2016) and Horny et al. (2016) assessed whether euro area corporate spreads contained a country component, once corrected for differences in bond characteristics. We follow more closely the approach suggested by Gilchrist et al. (2009) and Gilchrist and Zakrajšek (2012), as they extract excess bond premia regressing credit spreads against measures of credit risk and other term premia, controlling also for firm characteristics. Unlike all this analysis, we control for country observable risk by incorporating macroeconomic variables. Numerous papers in the literature on firms default show that firm level information (e.g. contained in balance sheet data) can be fruitfully augmented with information conveyed by macro-financial variables (Elton et al., 2001; Jarrow and Turnbull, 2000; Koopman and Lucas, 2005; Koopman et al., 2011). This is especially true in times of crisis (Koopman et al., 2012; Jacobson et al., 2013). Such approach allows us to investigate explicitly whether there is an additional country component in the euro area excess bond premia.⁴

Our study complements the work of Zaghini (2016), who using annual data focuses on asset swap (ASW) spreads of bonds in the primary market, typically purchased more cheaply by banking syndicates. Most importantly, the bonds are issued in different periods of the year and the time fixed effects estimate an average yearly country effect. Therefore, prices are not necessarily comparable across countries. In the same vein, regressors may not match the date of the bonds issued in the course of each year. We instead use a large number of bonds traded in the secondary market, whose prices reflect the last Friday of each month in each country. Second, all regressors are downloaded with a daily or weekly frequency, which allows one to match exactly the last Friday of each month in each country. Therefore, the country fixed effects estimate common developments in excess bond premia in that specific day. Third, we look at both yield-to-maturity spreads and ASW spreads.

We test financial integration assessing whether the country component of the excess bond premia is equal across all countries. Specifically, we carry out a Wald test on the cross-sectional equality of the unobservable country risk in each period t . An overall increase in the F-statistics would be consistent with an increase in the degree of corporate bond market fragmentation. This measure has the expected narrative, with fragmentation risk being relatively smaller just before the financial crisis started in August 2007 and rising sharply after Lehman's bankruptcy in 2008 and again since 2010 during the euro area sovereign debt crisis. Fragmentation declined after Draghi's speech in July 2012, who pledged to do "whatever it takes" to save the euro.

We show that the global volatility in asset prices (i.e. US VIX), the interbank credit risk (i.e. 3-month EURIBOR-OIS spread) and sovereign risk (i.e. countries' sovereign spreads) contributed only partly to fragmentation risk in corporate spreads. The euro area corporate bond markets remained fragmented and such risk emerged with all its strength during the financial crisis.

² The second paragraph of Draghi's introductory statement to the press conference on 2 August 2012 reads: "The Governing Council extensively discussed the policy options to address the severe malfunctioning in the price formation process in the bond markets of euro area countries. Exceptionally high risk premia are observed in government bond prices in several countries and financial fragmentation hinders the effective working of monetary policy. Risk premia that are related to fears of the reversibility of the euro are unacceptable, and they need to be addressed in a fundamental manner. The euro is irreversible."

³ The literature has investigated how one can determine exactly when a market becomes integrated (Bekaert et al., 2002). It could be argued that the date of certain regulatory, policy or institutional changes can be used as a proxy for the timing of financial market integration. For example, the introduction of the euro in January 1999 is considered a key date for the integration of the money market among euro area member states. However, the euro area experience in the recent crisis suggests that international financial integration not only is time varying, but most importantly is a never-ending process, as home bias attitudes may prevail.

⁴ Some of the macro-financial variables used in the paper measure credit risk as well as aggregate idiosyncratic risk (through for instance liquidity premia or risk appetite). Therefore, the excess bond premium is smaller than that estimated using the specification of Gilchrist and Zakrajšek (2012), which uniquely focus on firms' distance to default to measure credit risk, disregarding macro variables. However, this bias does not alter the interpretation of the estimated country shocks, namely the country-level deviation from the price as predicted by the fundamentals, and hence does not impact qualitatively the results. Moreover, since the estimates of the EBP in the paper are conservative, the results do not overestimate fragmentation.

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