Journal of International Money and Finance 83 (2018) 44–54

Contents lists available at ScienceDirect

Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

Bond market evidence of time variation in exposures to global risk factors and the role of US monetary policy

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ARTICLE INFO

Article history:
Available online 11 February 2018

JEL classification:
E52
G10
G15

Keywords:
Bond return
Global CAPM
Monetary policy
Risk factors
Spillover

ABSTRACT

This paper empirically shows that US monetary policy influences present and future exposures of developed markets' government bond returns to measures of global, systematic risk and thus affects the time variation of these returns. This finding highlights spillovers from US monetary policy to US dollar denominated foreign assets and to foreign assets denominated in other currencies than the US dollar. From an asset pricing perspective, the evidence reveals that exchange rate risk and time variation in sensitivities to global bond market and exchange rate risk are important to describe time variation in developed markets' government bond returns.

1. Introduction

This paper assesses the descriptive power of a global asset pricing model for bond returns of major currency areas. This assessment aims at answering two questions: Are exchange rate risks and time variation in exposures to global risk factors important for understanding the time variation in excess returns on the government bonds of the countries under study? If so, what drives the time variation in the sensitivities to global risk factors? Answers to these questions are relevant for asset managers and policymakers because government bonds do not only serve as benchmark assets in financial markets but are also at the center of most regulatory initiatives in the aftermath of the global financial crisis (IMF, 2012).

The main motivation for this paper's focus on developed economies' bond markets stems from Gourinchas and Jeanne (2012). They contribute to the discussions about shortages of safe assets (e.g., IMF, 2012) by arguing that only public assets such as central bank liabilities (central bank money) and government bonds have the potential to fulfill the basic criteria of safe assets.[1] It is hence vital to understand what forces influence prices and returns on supposedly safe assets such as government bonds.

The main motivation for this paper's focus on a global asset pricing framework as the basic workhorse of the empirical analysis stems from Longstaff et al. (2011). They analyze credit default swap (CDS) spreads to show that sovereign risk of G10 countries is to a large extent globally determined. In addition, Miranda-Agrippino and Rey (2015) argue that a single global risk factor accounts for a substantial part of cross-sectional dispersion in returns on a wide variety of different asset

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[1] According to the IMF (2012), these basic criteria are low credit or market risk, high (market) liquidity, limited inflation risk, low exchange rate risk and limited idiosyncratic risk. In addition, safe assets should not be dependent on characteristics such as the issuer of a bond.

https://doi.org/10.1016/j.jimonfin.2018.02.002
0261-5606/

classes. Hence, given the focus on returns on government (sovereign) bonds, a global asset pricing model is a natural benchmark for the purpose of this study.

The paper excludes the US from the analysis because I use the US dollar (USD) as the numeraire currency for the assessment of the importance of exchange rate risk. Against this background, the contribution of this paper is threefold.

First, it contributes to the asset pricing literature, mainly focused on equity markets, on the importance of exchange rate risks and time variation in the exposure to risk factors to explain asset returns.[2] This paper shows that explicitly accounting for exposures to exchange rate risk improves our understanding of time variation in the six countries' government bond excess returns under study. Employing a recently proposed econometric technique to assess the time series path of parameters, e.g., regression coefficients, by Müller and Petalas (2010), I find that time variation in the exposures to global bond market and exchange rate risk adds additional descriptive power. The improvement in the descriptive power of the global asset pricing model for bond returns is more pronounced than for the respective countries' stock market returns.

Second, this paper assesses the drivers of time-varying exposures to global risk. The motivation for this assessment is given by Rey (2013), who finds common movements in prices of risky assets, capital flows and banks' leverage ('global financial cycle'). This global financial cycle is contemporaneously correlated with VIX, the CBOE option implied volatility index of the S&P 500 stock index and a measure of (global) risk aversion and uncertainty (e.g., Bekaert et al., 2013). Furthermore, Rey (2013) and Miranda-Agrippino and Rey (2015) argue that US monetary policy is a key driver of the global financial cycle and the global component of asset prices. Using a VAR framework, I find that the US monetary policy stance, as reflected in the Fed's shadow rate, is a driver of time variation in the exposures of bond returns to global risk factors. This finding is far weaker for the VIX. These observations suggest that US monetary policy influences the quantity of global, systematic risk that developed markets' government bonds load up.

It is the third contribution of this paper to provide an analysis of the importance of time-varying quantities of global risk for international bond returns.[3] I find that a simple global unconditional CAPM explains between 40% and 70% of the time variation in government bond excess returns if time variation in risk factor exposures and exchange rate risk is taken into account. US monetary policy is a key driver of this time variation in risk factor exposures. This finding highlights the impact of US monetary policy spillovers on both US dollar and local currency denominated government bonds.

The remainder of the paper is organized as follows. Section 2 describes the conceptual background and the empirical framework. Section 3 presents the data and descriptive statistics of the government bond returns under study. Section 4 gives the empirical results. Finally, Section 5 concludes. An online appendix provides additional results.

2. Conceptual background and empirical framework

The basic workhorse of this paper is the empirical version of a global, unconditional CAPM (Solnik, 1974; Stehle, 1977). In this framework, the sensitivity to the return on the global benchmark ('market') portfolio is the only determinant of expected asset returns. The dependent asset returns and the return on the global market portfolio are expressed in the same currency. Translated into the empirical context of this paper, the global CAPM can be represented by the regression in Eq. (1)

$$r_t^{i,lc} - r_t^{f,i} = a^i + \beta^i \left(r_t^{global,lc} - r_t^{f,i} \right) + \varepsilon_t^i \tag{1}$$

in which the dependent variable is the return on the government bond index of country i $\left(r_t^{i,lc}\right)$ in excess of the respective country's risk-free rate $\left(r_t^{f,i}\right)$. It is regressed on the excess return on the global bond market denominated in the same, here local, currency $\left(r_t^{global,lc} - r_t^{f,i}\right)$. This paper focuses on government bond indexes of six developed countries (Switzerland, Japan, Germany, Australia, Canada and the UK) that predominantly issue local currency denominated bonds in contrast to many emerging markets (see, e.g., Borri and Verdelhan, 2011). Therefore, I express all variables in Eq. (1) in local currency terms.

The CAPM market portfolio is usually approximated by a broad stock market index. However, since the focus of this study lies on government bond excess returns, I use a broad global government bond index as measure of global, systematic risk on bond markets. This choice reflects evidence provided by Barr and Priestley (2004), who find that incorporating information from stock market data does not influence their assessment of international bond market integration for a similar sample of countries as in this study. In addition, Ilmanen (1995) shows that the evidence of bond return predictability by a global factor

[2] This evidence is related to the findings by Dumas and Solnik (1995), De Santis and Gerard (1998) and Harvey et al. (2002) that exchange rate risk is priced in the cross-section of stock market returns. It is also related to Hofmann et al. (2016) highlighting a link between emerging markets' sovereign bond returns and the corresponding US dollar exchange rate changes.

[3] This paper thus complements studies such as Barr and Priestley (2004), who assess bond market integration and the predictability of bond returns in a similar set of countries as this paper. Ilmanen (1995) finds that the predictability of international bond returns is related to global risk factors. Dahlquist and Hasseltoft (2013) show that a single global bond market risk factor predicts local currency bond returns of the major economies about as well as or better than its local counterpart. In addition, the global bond risk factor seems to be tightly linked to US bond risk premia. Borri and Verdelhan (2011) highlight that differences in exposures to US market risk explain cross-sectional differences in excess returns on portfolios comprised of US dollar denominated sovereign debt of emerging markets while Driessen et al. (2003) find that a single world interest rate level factor accounts for almost half of the variation in bond returns of developed markets.