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How did the financial crisis alter the correlations of U.S. yield spreads?[☆]

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We investigate the pairwise correlations of eleven U.S. fixed income yield spreads over a sample that includes the Great Financial Crisis of 2007–09. Using cross-sectional methods and nonparametric bootstrap breakpoint tests, we characterize the crisis as a period in which pairwise correlations between yield spreads were systematically and significantly altered in the sense that spreads comoved with one another much more than in normal times. We find evidence that, for almost half of the fifty-five pairs under investigation, the crisis has left spreads much more correlated than they were previously. This evidence is particularly strong for liquidity- and default-risk-related spreads, long-term spreads, and the spreads that were most likely directly affected by policy interventions.

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1. Introduction

A persistent state of turmoil engulfed the international financial markets – particularly U.S. equity, debt, credit, and derivatives markets – between the summer of 2007 and the late spring of 2009. A number of papers (e.g., Caprio et al., 2010; Galí, 2010) have labeled such a state, characterized by unsettled and dysfunctional markets, as the "Great Financial Crisis." There is now little doubt that the Great Financial Crisis ravaged U.S. fixed income (debt and credit) markets in unprecedented ways (see Dwyer and Tkac, 2009). Using data from the epicenter of the crisis, a range of U.S. fixed income markets, we pose two questions. First, can the Great Financial Crisis be truly seen as an approximately 2-year crisis episode that progressively abated to leave markets in a "normal" state similar to the one that had prevailed before 2007? Or second, to the contrary, was the Great Financial Crisis so pervasive that it left the relationships among different fixed income segments permanently altered?

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More generally, some economic literature has investigated the fabric that turns a state of turmoil in the fixed income market into a persistent regime so severe to merit being dubbed a crisis, or even a "great" one nonetheless. A number of papers have focused on anomalies in the univariate dynamics of the first (the level) and second (the volatility) moments of yield spreads, constructed as the difference between the yield to maturity of a risky asset and the yield of a comparatively less risky (or riskless) asset (see, e.g., Guidolin and Tam, 2010; Muir, 2013), sometimes also using event studies (see, e.g., Nippani and Smith, 2010). However, a multivariate approach focused on the comovement patterns across fixed income markets should also contribute to a useful economic characterization of the Great Financial Crisis. For instance, in a rare example of multivariate analysis, Dungey et al. (2010) develop a method based on structural identification via heteroskedasticity to separate market contagion from hypersensitivity during crises. They exploit the ability of multivariate generalized autoregressive conditional heteroskedasticity (GARCH) models to forecast the dynamics of correlations. However, their application concerns only the 1997–98 Asian crisis.

Another strand of the literature has intensely debated the exact dating of the Great Financial Crisis. The differing conclusions have often reflected the priors of the different researchers as well as their specific methodological approaches. With a few exceptions (e.g., Campbell et al., 2011; Frank and Hesse, 2009), most papers have agreed on early August 2007 as a potential starting date of the Great Financial Crisis, even though only a few have traced this claim back to the actual behavior of financial data. Moreover, only a handful of papers have ventured into establishing an end date for the Great Financial Crisis (see, e.g., Aït-Sahalia et al., 2009; Campbell et al., 2011; Guidolin and Tam, 2010). Usually such attempts have consisted of generic and informal claims about the possibility that the effects of the crisis were reabsorbed around mid-2009. In this paper, we develop a characterization of the Great Financial Crisis based on the multivariate behavior of a large set of fixed income yield spreads that offers a novel perspective on the end of the crisis.

Yield spreads measure various dimensions of risk. While studying the level of yields per se has value in certain contexts, many papers and articles in the literature favor the analysis of yield spreads because they offer a clearer picture of the underlying trade-offs for investors. We focus on fixed income yield spreads for several reasons. First, filtering a financial crisis through the lenses of spread data is an implicit way to relate financial events to the business cycle (see, e.g., Gilchrist et al., 2009). In general, yield spreads are likely to be informative of the channels through which financial prices affect the real side of the economy. In particular, fixed income spreads tend to widen shortly before the onset of recessions and to narrow again before recoveries. Analyzing the behavior and the common dynamics of yield spreads based on interest rates derived from the core of the financial crisis (i.e., fixed income markets) sheds light on some important aspects of the turmoil and on the relationship between economic activity and the evolution of fixed income markets. Second, economists are generally interested in understanding the mechanisms that link variables in a given market. The extent of comovement between fixed income yield spreads may have consequences for the cost of borrowing, the portfolio diversification strategy of investors of various types, and the modeling and forecasting of interest rates in the market under investigation. Moreover, a good understanding of the dynamics of credit and liquidity risk premia incorporated in the prices of fixed income securities potentially has a number of practical implications for portfolio managers and policymakers. On the one hand, through such understanding, financial market regulators may be able to improve capital allocation functions and the information aggregation process in fixed income markets. Furthermore, they may be able to evaluate the robustness of such markets to shocks to the financial system. On the other hand, investors may want to look at the dynamics of credit and liquidity risk premia to derive better information about the return and diversification properties of major asset classes. Overall, a careful assessment of the main characteristics of such premia may be associated with better investment and policy decisions over the business cycle.

Given these premises and objectives, we systematically investigate the empirical behavior of pairwise correlations between eleven U.S. fixed income spreads over a sample of weekly data between 2002 and 2011. These spreads are distinct in terms of the securities or markets to which they refer, the maturity of the underlying securities, and whether they were affected by specific policy measures by the Federal Reserve and policymakers more generally (e.g., the Treasury and the Federal Deposit Insurance Corporation) in reaction to the Great Financial Crisis. Our series measure yield spreads for a variety of instruments and markets, namely, 3-month London interbank offered rate (LIBOR) unsecured deposits, 3-month unsecured financial and asset-backed commercial paper (ABCP), 5-year swaps, 5-year Resolution Funding Corporation (REFCorp) strips, 5-year Aaa private-label commercial mortgage-backed securities (CMBS), 10-year off-the-run Treasury securities, 20-year Moody's Baa-rated and Aaa-rated corporate bonds, 20-year Moody's Bbb-rated and Aa corporate bonds, and 30-year conventional fixed-rate mortgage-backed securities (MBS). This list also includes two typical mortgage-related risk premia because the U.S. mortgage market is identified as the catalyst of the financial crisis (see Frank and Hesse, 2009).[3]

We use a mixture of cross-section econometric methods to test the existence of nonzero correlations for groups of spreads and test for breaks in the correlations between spreads. We generally reject both the null hypothesis of no cross-section correlation between spreads in all subperiods we consider and the null hypothesis of constant pairwise correlations over time. We provide a characterization of the Great Financial Crisis as a period during which pairwise correlations between yield spreads were systematically and significantly altered, with spreads comoving with one another much more strongly than in "normal" times. Our work is consistent with the intuition that the Great Financial Crisis was a period of structural and systematic alteration of

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[3] Data for a variety of mortgage rates are also available. We use yield spreads from two portfolios for which the construction of long time series is possible: a 5-year index of Aaa private-label fixed-rate CMBS yields computed by Bloomberg/Morgan Stanley and an index of 30-year fixed-rate residential prime mortgage rates computed by Freddie Mac. Portfolio index series also exist for lower-rated private-label MBS and CMBS, but these time series are too short for use with the econometric methods applied in this paper.

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