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An empirical analysis of the impact of the credit default swap index market on large complex financial institutions ☆

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ABSTRACT

This paper contributes to the primarily empirical literature by conducting the first extensive empirical analysis of the impact of the degree of co-movement in the main standardized credit default swap (CDS) indices on the group of large complex financial institutions (LCFIs). We attempt to account for the dynamics between banks' equity returns and most liquid CDS market indices, the investment grade 5-year CDX North America and the investment grade 5-year iTraxx Europe, through conditioning our analysis on the historical correlation between the variables. Our most important findings are threefold. First, we find that equity returns for all the LCFIs are negatively correlated to both the CDX and the iTraxx indices. Second, the CDX index is the dominant factor driving shocks across all the LCFIs and this effect is stronger for European than US banks. Third, the impact of CDS market volatility on the equity return volatility of LCFIs appears very pronounced, suggesting a transmission mechanism which results in the destabilisation of banks and a subsequent increase in their default risk.

1. Introduction

A major structural innovation in the financial system has been the development of a market for credit risk transfer (CRT). This market offers a rapidly increasing number of instruments to deal with different aspects of credit risk. Besides providing default protection for individual firms through CDSs, the credit risk in entire credit portfolios can now be traded by means of collateralized debt obligations (CDOs). Essentially, a CDO represents a set of claims or tranches of varying exposure to the cash flows from a portfolio of credit instruments.

The overall market for over-the-counter derivatives shot up to $455 trillion at the end of 2007. Some $62 trillion of that were CDSs, whose supercharged growth continued despite of the credit crunch. Conceived in the 1990s as a hedging tool, CDSs soon took off as a way to speculate on the likelihood of a firm going bust without having to trade its underlying bonds. For much of this decade, they have been celebrated as a means of spreading risk around the financial system.

The subprime crisis that unfolded in 2007 morphed into a credit crisis that caused major disruption to financial institutions in the United States (US) and Europe. A number of internationally active banking groups, with large credit-related exposure, were severely affected by the financial market turmoil, particularly those with sizeable exposures to US mortgage-related asset-backed securities (ABSs) and CDOs. Consequently, the intensifying solvency concerns about a number of the largest US-based and European financial institutions dramatically pushed the global financial system to the brink of systemic meltdown.

In this study we focus on the global CDS index market and its implications for the value of equity of systemically important financial institutions.

Central to this research is the role played by financial innovation in today's globally integrated financial markets and their potential consequences for the stability of systemically important financial institutions. Basically, we advocate that it is important to examine the potential linkages between developments in the CDS index markets and LCFIs since the viability of these institutions is, in particular in the

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aftermath of the global financial crisis, key to the stability of the international financial system.[2] Consequently, knowledge of the extent to which LCFIs are interrelated—and exposed—to other financial markets is critical for the assessment of risks to financial stability emanating from these institutions. Thus, understanding the nature and the effects of financial innovation in financial markets on major financial institutions is of fundamental importance.

Today, the index tranche market is very much the "on-the-run" market for synthetic CDOs. Many billions of dollars in notional risk are traded each week through benchmark products in the US, Europe, and Asia, spanning investment grade and high yield markets. The index tranche market has introduced valuation transparency to a point where a standardized correlation model has emerged. Liquidity in off-the-run index tranches has broadened the index tranche market quite substantially. The index tranche market itself has evolved quite a bit, with today's products centered around the *CDX* and *iTraxx* family of indices, with healthy activity across the term structure and even within off-the-run indices.

We address a number of global financial institutions of the US and European banking industry that could undergo distress on a systemic scale.

Specifically, this paper focuses on the group of *Large Complex Financial Institutions* (LCFIs) as defined by the Bank of England (2001).[3], *Financial Stability Review*, No. 11, London, describes the criteria used to determine an LCFI peer group. The financial institutions selected are ranked in the top 10 in at least two of the following six categories: (i) equity book runners, (ii) bond book runners, (iii) syndicated loans book runners, (iv) interest rate derivatives outstanding, (v) foreign exchange revenues, and (vi) holders of custody assets. LCFIs include the world's largest banks, securities houses and other financial intermediaries that carry out a diverse and complex range of activities in major financial centres.[4] These financial institutions are *ABN Amro,*[5] *Bank of America*, *Barclays*, *BNP Paribas*, *Citigroup*, *Credit Suisse*, *Deutsche Bank*, *Goldman Sachs*, *HSBC Holdings*, *JPMorgan Chase*, *Lehman Brothers*, *Merrill Lynch*, *Morgan Stanley*, *Société Générale* and *UBS*.

LCFIs play a pivotal role in the international financial system as intermediators of risk and as providers of liquidity to capital markets. LCFIs can be considered as institutions whose size and nature of business is such that their failure and inability to operate would most likely spread and have adverse implications for the smooth functioning of financial markets or other financial institutions operating within the system. If the disturbance were large enough to threaten financial system stability it could be transmitted through various channels—including payment systems and markets—but would most likely originate from an institution being unable to meet its payment and settlement obligations (ECB, 2006).

Movements in banking stock prices provide a market-based measure of investors' assessment of corporate credit risk. Overall, changes in the CDS index market have the potential for creating equity losses resulting in stress to systematically important LCFIs. The main intuition is that as banks deliberately undertake risky projects that embed counterparty risk the value and volatility of the bank assets will co-evolve with developments in the CDS index market.

The potential for instability in pricing credit risk in the tranches index market could result in broad spillovers and/or mark- to market losses. Hence, a metric attempting to capture the extent of LCFIs returns sensitivity to the CDS index market provides an indirect measure of institutional susceptibility to default risk. Indeed, broader credit deterioration and falling credit prices could combine into a substantial hit to the equity capital of systematically important LCFIs.

This paper extends the approach used by Chan-Lau and Ong (2006).[6] Employing a VAR model, the authors show that the use of credit derivatives by the major UK financial intermediaries does not pose a substantial threat for the *stability* of the UK financial system. In fact, exposures across major financial institutions appear sufficiently diversified to limit the impact of any shock to the market, while major insurance companies turn out to be largely exposed to the "*safer*" senior tranches.

To our knowledge this paper is the first to investigate the dynamics between banks' equity returns and major tranched CDSs indices. Unlike most existing works on links between the CDs market and the fragility of the banking system, an indirect measure of banks' fragility—the variability of banking stock returns—is employed. We apply a parsimonious vector autoregression (VAR) model. The advantage of the VAR is that it estimates how banks' prices change following adverse CDSs shocks implying that the stress test is conditional on the historical correlation among the variables in the multivariate model.

This paper makes two major contributions to the literature.

At first, from a methodological standpoint, it complements existing work on the implications of structured credit products volatility for financial sector stability. We do this by applying an innovative modelling approach which handles the VAR methodology to readily available financial market data. The second contribution, from an empirical perspective, is to provide evidence of the impact of the evolution of the co-movements—i.e. correlation—between the standardized CDSs indices prices on the global banking sector, by assessing the extent to which LCFIs asset prices are driven by the evolution of volatility in the CDS index market.

No conventional theoretical economic model describes the relationship from CDSs variables to bank returns and vice versa (for example by affecting CDSs spreads levels and thus the magnitude of credit risk).

Nonetheless, there are several earlier studies dealing with related issues.

Fama and French (1993), for instance, find some commonality in risk factors affecting the stock and the bond market. Kwan (1996) studies the relationship between the corporate bond market and the stock market and finds a negative correlation between bond yield changes and stock returns.

Campbell and Taksler (2003) seminal study on the relationship between stock return volatilities and bond yields shows that firm-level volatility can explain much of the variation in US corporate bond yields.

The US CDS market and its relationship with the US stock market are investigated in Longstaff, Mithal, and Neis (2005) where both the CDS market and the stock market are found to lead the bond market. Moreover, no clear lead-lag relationship is found between the stock market and the CDS market.

Norden and Weber (2009) investigate the European CDS market and finds CDS spread changes to be negatively correlated with stock returns. Furthermore, stock returns appear to lead CDS spread changes.

Our paper is also closely related to a study by Bystrom (2005).[7] This author provides indeed the first attempt to investigate the relationship between the CDS index market and the stock market. For a sample of European sectoral iTraxx CDS indices, a correlation analysis reveals a close link between the two markets. CDS spreads have a strong tendency to widen when stock prices fall and vice versa. Stock price volatility is also found to be significantly correlated with CDS spreads and the spreads are found to increase (decrease) with increasing (decreasing) stock price volatilities.

[2] The stability of the banking sector and the financial system at large is of the utmost importance for a sustainable and stable growth of the global economy. The extent to which the increasing marketability of credit risk can influence credit and economic cycles is of particular macroeconomic importance.

[3] The Bank of England, (December 2001).

[4] For the purposes of financial system stability assessment, it is important to identify and monitor the activities of banking groups whose size and nature of business is such that their failure and inability to operate would most likely have adverse implications for financial intermediation, the smooth functioning of financial markets or other financial institutions operating within the system.

[5] We omit from the sample Abn Amro since in 2007 it was taken over by a consortium of European banks led by Royal Bank of Scotland (RBS) Group. Accordingly, we deem more appropriate to include RBS in the banking sample.

[6] Chan-Lau and Ong (2006), *The Credit Risk Transfer Market and Stability Implications for U.K. Financial Institutions*, IMF Working Paper No. 06/139.

[7] Bystrom (2005), *Credit Default Swaps and Equity Prices: The iTraxx CDs Index Market*, Working Paper, Lund University.