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Central clearing and collateral demand ☆

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ABSTRACT

We use an extensive data set of bilateral credit default swap (CDS) positions to estimate the impact on collateral demand of new clearing and margin regulations. The estimated collateral demands include initial margin and the frictional demands associated with the movement of variation margin through the network of market participants. We estimate the impact on total collateral demand of more widespread initial margin requirements, increased novation of CDS to central clearing parties (CCPs), an increase in the number of clearing members, the proliferation of CCPs of both specialized and non-specialized types, collateral rehypothecation practices, and client clearing. System-wide collateral demand is increased significantly by the application of initial margin requirements for dealers, whether or not the CDS are cleared. Given these dealer-to-dealer initial margin requirements, mandatory central clearing is shown to *lower*, not raise, system-wide collateral demand, provided there is no significant proliferation of CCPs. Central clearing does, however, have significant distributional consequences for collateral requirements across market participants.

1. Introduction

We use an extensive data set of bilateral credit default swap (CDS) positions to estimate the impact of new central clearing and margin regulations on the aggregate market demand for collateral. In contrast to previous work based on hypothetical or roughly calibrated exposures, we use an actual network of long and short CDS exposures. We consider the implications for collateral demand of a variety of alternative market structures.

Central clearing for all standardized over-the-counter (OTC) derivatives is a key element of the ongoing reform of the financial system (Financial Stability Board, 2013). A central clearing party (CCP) steps into bilateral trades by means of novation, becoming the buyer to every seller, and seller to every buyer. By taking on and subsequently mitigating counterparty credit risk, CCPs insulate their members from default losses. To this end, they collect collateral in the form of initial and variation margins, among other risk-management procedures.

Central clearing introduces a trade-off in collateral demand between the benefits of multilateral netting within a class of contracts against lost bilateral netting

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benefits across contract types.[1] Duffie and Zhu (2011) and Cont and Kokholm (2014) demonstrate the key role in this trade-off of the market network structure and of the covariance of price changes across asset classes, but do not provide a clear-cut answer as to which effect dominates. Furthermore, these prior studies did not rely on actual bilateral exposure and price data, and were limited to simplified market structures.

The impact of regulatory reform of the derivatives markets on collateral demand is a key concern for policy makers. On the one hand, because CCPs are set to become direct and large counterparties to the most important market participants, the increasing use of central clearing raises concerns about the concentration of risk within a few institutions.[2] High collateralization standards, central clearing, and capital requirements, among other new regulatory standards, have become the new norm. On the other hand, there have been concerns, for example those of Singh (2010), over the extent to which CCPs tie up large amounts of cash or high-grade assets. In the empirical literature, a number of authors have assessed changes in collateral demand due to mandatory central clearing, arriving at a broad range of estimates, recently compiled by Sidanius and Zikes (2012).

We use a comprehensive data set of CDS bilateral exposures covering about 31.5% of the global single-name CDS market to assess the impact of a variety of margining and clearing schemes on collateral demand and its decomposition. The case of CDS is of particular interest because credit risk is correlated with systemic risk. Furthermore, CDS feature jump-to-default risk, thereby increasing the volatility of market values. Our sample, obtained from the Depository Trust & Clearing Corporation (DTCC), covers virtually all CDS bilateral exposures on 184 reference entities representing 31.5% of the global single-name CDS market as of the end of 2011. Uniquely among available data sets, this data set includes all counterparties at a *global* level for each referenced name, and is thus well suited to analyze the implications of margining and netting in the aftermath of the global derivatives market reform. Prior empirical work used aggregate data releases for dealers (Heller and Vause, 2012), or market-wide data (Sidanius and Zikes, 2012) at a product-level (CDS and interest rate swaps), thus missing some key effects of network structure and of the heterogeneity of counterparty portfolios. As a result, the multilateral netting benefits of clearing may have been misestimated in earlier work.

We study a variety of clearing schemes and market structures. Previous work had studied only simple market structures. Starting from a base case, either with or without new dealer-to-dealer margin requirements, we analyze four effects: an increase in novation to existing CCPs, an increase in the number of clearing members, an increase in the number of CCPs, and client clearing. (In a "client clearing" regime, dealers clear the derivatives portfolio of their client end-users.) The second and the fourth of these effects had not been examined in prior work on this subject. Although the effect on collateral demand of increasing the number of CCPs had been investigated by Duffie and Zhu (2011), that study was severely limited by lack of access to bilateral exposure data. We distinguish between the impact of adding "specialized" CCPs, as opposed to "non-specialized" CCPs, which are shown to be substantially less efficient in collateral use because of lost netting and diversification opportunities. This type of CCP specialization is indeed observed in the data. As opposed to prior research, our data enable us to model both dealer and customer positions.

We estimate a fully specified margin model that allows a decomposition of margin demand both by trader type (customer or dealer) as well as by type of margin demand. Our model captures portfolio-specific initial margins, a contract-specific short charge for net CDS sellers, a precautionary buffer stock of unencumbered liquid assets designed to meet uncertain near-term variation margin calls, and the "velocity drag" of collateral movement within the financial system. The last two of these components had not been examined in previous research. We show that these frictional demands for variation margin may have a significant impact on total collateral demand. Our model captures how these various components of margin demand incorporate the effects of cross-counterparty netting and diversification, which change with the clearing scheme and network structure.

Overall, we show that system-wide collateral demand is increased significantly by the application of initial margin requirements for dealers, whether or not CDS are cleared. Given the new requirement for dealer-to-dealer initial margins, mandatory central clearing is shown to substantially *lower* system-wide collateral demand, provided there is no significant proliferation of CCPs. A shortcoming is that we are unable, for lack of the necessary data, to incorporate the implications of central clearing for the netting of bilateral exposures of CDS against non-CDS positions, an issue considered by Duffie and Zhu (2011).

We show that client clearing reduces system-wide collateral demand provided that dealers are able to reuse a large enough share of the collateral that they receive from their clients. The drop in collateral demand is driven by cross-counterparty netting and by diversification benefits, both for customers and dealers, and depends on the size of each investor's portfolio. Netting and diversification benefits outweigh increased initial margin requirements for investors whose portfolios are large enough. Clearing thus has distributional consequences across investors, favoring traders with large and well-diversified portfolios. Collateral demand for investors with a low multilateral net-over-gross notional exposure can be significantly reduced when central clearing is implemented.

[1] Absent a CCP, bilateral netting opportunities exist across asset classes, or with contracts that are not eligible for central clearing. In contrast, multilateral netting through a CCP is typically possible for one asset class only and, within an asset class, for a subset of contracts being liquid or standardized enough. See Duffie and Zhu (2011) for a detailed theoretical investigation of this trade-off.

[2] For example, the US Financial Stability Oversight Council has designated a number of CCPs as systemically important under Title VIII of the Dodd-Frank Act.