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The international syndicated loan market network: An “unholy trinity”?[☆]

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ABSTRACT

This paper provides a descriptive analysis of the international network of syndicated loan lenders through an examination of its topology and structure using network theory measures. The author studies both the undirected and directed graphs, weighted and unweighted connections, as well as different sub-networks based on lender type and geographical regions. Results show that the networks and sub-networks generally display an “unholy trinity” of structural properties that can be related to network robustness and stability. Specifically, lender networks have high complexity and connectivity, have a small-world structure characterized by proximity and clustering and also display scale-free characteristics with preferential attachment.

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1. Introduction

The 2008 bank crisis has highlighted the connectedness of financial institutions around the world. While such networking has many informational and transactional benefits, it can also have important consequences for the global financial system. As a matter of fact, just as banks were once deemed “too-big-to-fail”, the recent contagiousness of failures also indicates a potential “too-connected-to-fail” problem.¹ In this context, network theory can provide helpful tools and measures to better understand the effects of networks or, to quote Allen and Babus (2009): “Mapping the networks between financial institutions is a first step towards gaining a better understanding of modern financial systems.”

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¹ IMF Global Financial Stability Report, April 2009.

In a much cited speech in 2009, the executive director of financial stability at the Bank of England talked about the “unholy trinity” of characteristics displayed by many financial networks: high and rising degrees of interconnection, long-tailed degree distribution and small-world properties.² These structural characteristics of networks, which will be discussed further in Section 2, are important for a number of reasons, including the efficiency, robustness and stability of financial systems and markets (Haldane, 2009).

Although financial institutions can be directly connected in many ways, such as through inter-bank loans and deposits or credit derivatives, they can also be *indirectly* connected by holding similar portfolio exposures, such as through syndicated loans. To be sustainable, the syndicated loan market relies on an international network of connections without which lenders could not support the risk levels implicit in these loans, because of either the sheer size of the loans, or the risk of the borrower within each bank’s portfolio. Financial institutions therefore form and maintain complex networks of ties that allow them to share information, risk and profits. Lenders typically perform repeat syndication arrangements with a network of partners over time in different investments, sometimes acting as the lead arranger and sometimes as a participant.

However, while the literature on the syndicated loan market is expanding and ranges from syndicate composition and agency problems to loan spreads, little is known about the underlying network of institutions that constitutes this important market. The objective of this paper is thus twofold. The first objective is to perform a topology of the international network of financial institutions involved in the syndicated loan market, highlighting differences across countries or financial sectors, using financial network analysis.³ The second objective is to determine the major properties of the structure of this global network and important sub-networks and determine if they exhibit the “unholy trinity” of network characteristics mentioned above. Financial network analysis, which relies heavily on the techniques of graph and network theory, is used herein to analyze the properties of inter-firm networks in the international syndicated loan market between 1990 and 2009.

Overall, this paper makes two main contributions to the finance literature. The first contribution relates to the importance of assessing the structure of the international syndicated loan market network. Knowing the characteristics and structural properties of this complex network can help shed light on the underlying connections between financial institutions, as well as the network’s strengths and weaknesses for the participating institutions and for the international financial system. While it’s crucial to understand what is the impact of interconnectedness on the stability and robustness of the system, it’s imperative to start by understanding *how* banks are interconnected. This study focuses on the descriptive aspect of the network in order to do an in-depth analysis of its structure and major properties. The study also contributes to the syndicated loan literature by providing complementary insights and analysis to better understand this market and the formation of lender syndicates. Since this literature is principally based on statistical and econometrical analysis, using a complementary approach can add to the general comprehension. To my knowledge, this is the first study to examine the network formed through lenders’ syndicate connections using formal network theory and metrics.

The remainder of the paper is organized as follows. Section two reviews the literature on network analysis in finance and connections in the syndicated loan market. The research hypotheses and data are discussed in section three. The methodology and results for the topology and tests of small-world and scale-free characteristics of the networks are presented in Section 4. Section 5 discussed the conclusions and implications of the paper.

2. Literature review

2.1. Network analysis in finance

With a few exceptions, the literature on networks in finance is very young.⁴ One strand of this literature focuses on modeling contagion risk through direct linkages. This research indicates that the way

² Andrew H. Haldane (2009) in a speech delivered at the Financial Student Association in Amsterdam.

³ This paper deals with the network of syndicated loan lenders and not the network of all financial institutions. If a specific institution is not involved in the syndicated loan market, it is not considered in the analysis.

⁴ See Allen and Babus (2009) for a comprehensive review of the literature on the use of network models in finance.

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