



Novel three-bank model for measuring the systemic importance of commercial banks



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ABSTRACT

Relaxing the hypothesis on the scale level of a bank, the present paper develops an improved three-bank model for analyzing the relationship between the size and the systemic importance of a bank. The proposed model is more general and more operational compared with other models. By introducing the L function based on the multivariate extreme theory and the systemically important index, the effect of the size on the systemic importance of a bank is analyzed. The size is found to be a necessary but insufficient condition for measuring the systemic importance of a bank. The size of a bank plays a critical role in evaluating systemic importance, but when the size reaches a certain threshold, its effect is weakened. The current study has theoretical and practical significance for the recognition and supervision of the systemic importance of banks.

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1. Introduction

In summarizing the lessons of the financial crisis in 2008, the International Monetary Fund (IMF) has cited that one of the roots of the crisis is the insufficient attention provided by the regulatory authorities to risk concentration and systemic risk accumulation resulting from financial innovation (IMF, 2009). Therefore, a reform to enhance systemic risk monitoring and coordinate the international efforts to execute macroprudential supervision should be implemented (BIS et al., 2009). Moreover, a large number of scholars agree that the global financial crisis reflects the defects of microprudential supervision, which only emphasizes a partial equilibrium in the entire financial system without seeking an overall equilibrium (Kashyap et al., 2008; Brunnermeier et al., 2009; French et al., 2010). As Bernanke (2008) stated:

“Under our current system of safety-and-soundness regulation, supervisors often focus on the financial conditions of individual institutions in isolation. An alternative approach, which has been called systemwide or macroprudential oversight, would broaden the mandate of regulators and supervisors to encompass consideration of potential systemic risks and weaknesses as well.”

Hence, the Basel Committee for Banking Supervision (BCBS) has placed a higher capital requirement for systemically important banks, which are asked to hold at least 1% more capital than others through

the BCBS-issued Basel III on December 16, 2010 (BCBS, 2010). According to Weistroffer (2011), the systemic importance of a financial institution lies in the fact that a total disorder or a serious crisis will ensue when it falls into a liquidity crisis, encounters insolvency, or withdraws from the financial market because of bankruptcy.

After the subprime crisis, both the academia and regulatory authorities began to study the systemic importance of financial institutions, and proposed different methods to measure the systemic importance of banks. For example, Zhou (2010) develops a three-bank model for analyzing the relationship between the size and the systemic importance of a bank by adding another bank, as opposed to the two-bank model proposed by De Vries (2005), which is aimed at gauging systemic risk. However, the three-bank model by Zhou simply comprises one large bank and two comparably smaller banks. The three-bank model is actually similar to the two-bank model in its consideration of bank size. Moreover, there may be a non-linear relationship between the size and systemic importance of banks, the validation of which requires further study. Based on this concept, the present study constructs an improved three-bank model by resetting the scale levels as large, medium, and small for improved generalizability. Combining the L function in the Extreme Value Theory and the PAO index (the probability that at least one bank becomes distressed) proposed by Segoviano and Goodhart (2009), the relationship is further assessed, and the size of a bank is found to be a necessary but insufficient condition for determining its systemic importance. This result satisfies the role of the size of the bank in evaluating its systemic importance, which was set by the BCBS as well. The current study indicates that size is not the only factor affecting the systemic importance of a bank, thus extending and enriching the research in this area.

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2. Literature review

2.1. Systemically important banks (SIBs)

Systemically important banks are main parts of systemically important financial institutions (SIFIs) because banks are major financial intermediations in most countries. G-20 members agree that a financial institution can be considered systemically important if its failure or malfunction may cause widespread distress, either as a direct impact or as a trigger for broader contagion (BIS et al., 2009). BIS et al. (2011) classified SIFIs into two categories, namely, global systemically important financial institutions (G-SIFIs) and domestic systemically important financial institutions (D-SIFIs). BCBS (2012) proposed global systemically important banks (G-SIBs) and domestic systemically important banks (D-SIBs) for banking. Undoubtedly, SIFIs exhibit several negative characteristics.

2.1.1. Huge negative externalities

Externalities (spillover) are impacts of the economic activities of an entity on another without paying any cost or getting any compensation. Externalities can be considered positive if these activities are beneficial; and negative otherwise. BCBS believes that negative externality is an essential characteristic of SIFIs, which means that the business behavior of SIFIs could adversely impact the financial system and other financial institutions during a financial crisis.

(a) *Too big to fail* (TBTF) means too big to be allowed to fail in a fashion that includes options other than the entire bank rescue, which imposes losses on people other than the equity providers (Turner, 2009). The impact on society cannot be estimated as soon as SIFIs go bankrupt. The bankruptcy of SIFIs could sometimes result into a recession for the entire economy, which the government would want to avoid. Therefore, the government will choose to rescue these financial institutions in many cases, which is precisely one of the painful lessons of the financial crisis. (b) *Too connected to fail* (TCF) is the financial institution that is most active in the market. This institution is the net center of financial system and is closely connected to other financial institutions. In the present financial crisis, the larger banks did not commit the first mistakes and intensified the crisis. By contrast, the real “culprits” were the banks that were not large, but are strongly associated with other financial institutions. SIFIs have the ability to spread the financial and economic system of financial stress based on the size of their business, important market functions, and relationship with other financial institutions and markets. In view of this, several scholars have paid attention to the correlation between SIFIs and other financial institutions (Drehmann and Tarashev, 2011). (c) *Too-Important-to-Fail* (TITF) was first proposed in the International Monetary Fund (Ötoker-Robe et al., 2011) policy report in May 2011. The market believes that SIFIs could obtain some invisible guarantee, which allows them to conduct risky business because of the TITF status of SIFIs. This situation finally resulted in moral hazard and dilemmas for the government. Meanwhile, the abuse of the TITF status by SIFIs may lead to financial market distortions and unfair competition and profit use with regulatory gaps. (d) *Too-Similar-to-Fail* (TSTF) is another SIFI feature that was highlighted in the present crisis. As important nodes of highly interconnected financial network, SIFIs form common exposure through equity investment, issued and held financial bonds, and reported other security derivatives. Thus, most or the entire part of the financial system simultaneously face bankruptcy as soon as any institution holding the same or similar risk assets and positions goes into bankruptcy or malfunction.

2.1.2. Moral hazard

(a) Regulatory tolerance policy. The government or the central bank normally bails out SIFIs either through fiscal assistance or through refinancing, which is called regulatory tolerance policy. This approach is employed to distinguish other regulatory policies for non-SIFIs because of the huge negative externalities when SIFIs go bankrupt. The

moral hazard of SIFIs results in the final relief from the government or central bank. The huge relief funds from the government can be extensively turned into private benefits of executives and shareholders. The emergence of adverse selection is even worse, which makes SIFIs more risky and more likely to engage in high-risk operations. (b) Emergence of forced and shift mechanism. SIFIs make full use of the features of TBTF or TCF to pursue high-risk businesses, which leaves the costs to the government or the taxpayers and forces the government to relieve them. These performances contribute disorder to the financial system. (c) Vicious circle. Regulatory authorities paid attention to moral hazard at the beginning of the present financial crisis. Thus, the US Ministry of Finance and Fed did not rescue the Lehman Brothers when it went bankrupt. However, the US government did not expect the mass-market volatility caused by the bankruptcy of the Lehman Brothers. The volatility compelled the government to give up moral hazard and to relieve AIG. However, the latter issued up to \$165 million worth of executives bonuses in 2008.

2.1.3. Unfairness of competition

The appearance of SIFIs results in distorted competitive markets. On the one hand, the implicit guarantee of the government results in a slow and indistinct market, which twists the fair competitive mechanism and accumulates universal risk. On the other hand, the psychological expectations of participants cause the market failure to correct the malfunction mechanism. The negative effects of regulatory tolerance policy provides the market with a psychological expectation that SIFIs will never fail, which does not let market investors vote with their feet or their hands and restricts the high-risk business of SIFIs.

2.1.4. Asymmetric costs and benefits

The high-risk activities of SIFIs could let them obtain high profit while they leave the risk to the entire financial system and society. The government and taxpayers paid for systemic crisis from SIFIs. Undoubtedly, the difficulty of securing fragile credit during the crisis is attributed to this system. Thus, the rules of economic operation are weakened and the responsibilities, functions, and credibility of financial institutions are reduced.

2.2. Measures of SIBs

Two categories of measures are used to distinguish SIBs. One of the methods is called indicator methodology, which directly provides the indicators and evaluation value based on the main features of SIBs. The other measure is called market method, which uses related market volatility data among financial institutions to measure the risk contribution of SIBs to the financial system. The main difference between the two methods is the different perspectives in understanding the meaning of SIBs. The indicator methodology reflects the accumulated experiences of international financial regulatory authorities and monetary authorities, which is a more intuitive understanding and judgment to SIFIs. The market method is based on the risk management model of financial markets and calculates the contribution of every participant to the financial system.

2.2.1. Indicator method

International financial regulatory authorities were the first to use the indicator method. The advantages of this method include increased transparency and a quick and simple way of identifying SIFIs. The disadvantages of this method are its empirical and arbitrary features, which result in its inability to distinguish the contribution of a financial institution to systemic risk with risky events. In 2013, BCBS announced an updated assessment methodology for global systemically important banks (BCBS, 2013). The selected indicators include size, interconnectedness, substitutes or financial institution infrastructure, cross-jurisdictional activity, and complexity. Every indicator has a uniform weight of 20% to calculate the systemic important score of a bank. However, with the

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