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Diversification and Contagion: Connections and some regulatory implications

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1. Introduction[1]

The traditional view on conglomerate firms puts forward the benefit that risk diversification has on reducing the likelihood of financial distress, and the resulting drop in the cost of external finance (see Froot, Scharfstein and Stein, 1993).[2] The argument applies in principle also to financial conglomerates, and may be a factor that contributed to the emergence of large universal banks in the US following the repeal of the Glass Steagall act in 1999. Since the financial crisis of 2007, there has been a shift in the policy debate towards highlighting the negative effects of contagion. The fear of contagion, among other issues, has led to a call for ring-fencing financial systems and institutions, including a reintroduction of a separation of different types of banking activities, see for example the policy proposals in the US (Volcker rule), and Europe (Vicker's and Liikanen reports).

[1] This article is based on a presentation made to the Belgian Financial Forum on the 19 June, 2017.

[2] There are, of course, other facets to conglomerates than just diversification, e.g., gains from synergy, or costs due to organizational complexity and which have been the subject of research for a long time. For the sake of focus, we ignore those other aspects in this article.

The shift from emphasizing benefits of diversification towards a fear of contagion, begs the question how diversification and contagion are linked to one another. This article aims to highlight the deeper

connection between diversification and contagion. I will illustrate that diversification and contagion can be understood as different sides of the same coin. I will then develop some regulatory implications. In particular, I will argue that capital requirements and regulation that leads to segmentation are not independent policy tools. As such it would be desirable for policy makers to appreciate the interactions between the two policy tools when deciding on a mix a of financial regulations.

2. Diversification and Contagion

In order to highlight the connection between diversification and contagion, I will develop a stylized example. The analysis follows the research developed by Stiglitz (2010) and Banal Estanol, Ottaviani and Winton (2013).

Suppose there are two banks *A* and *B*. These could be thought of literally as two banks operating in different countries, or they could be a bank and an insurance company, or they could be a retail and an investment bank. Suppose each bank may experience a random shock in the form of a future

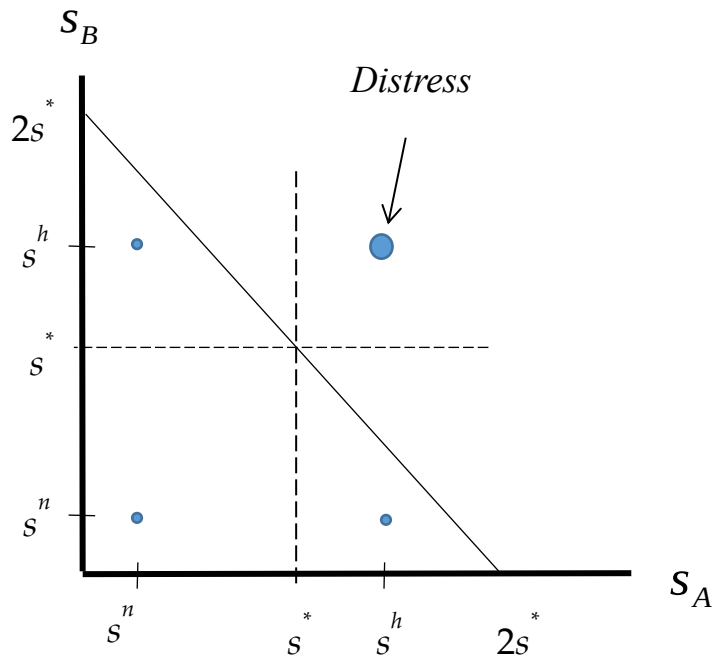
trading loss, or write down of bad loans. We denote bank *A* and *B*'s shocks by S_A and S_B, respectively. In order to keep things simple, suppose that shocks have only two possible realizations. They can either be of a normal magnitude ($s^n \geq 0$) or high (s^h). Suppose also that the probability of a "normal" shock is known to be p. Finally, suppose each bank is capitalized so as to be able to withstand a shock up to a magnitude s* and assume $s^n < s^* < s^h$. Plausibly, we can think of *p* as being a high probability, that is, a high shock s^h is a rare event and therefore it would be too costly to be capitalized to withstand such rare shocks.

By construction, a stand-alone bank, be it *A* or *B*, has a distress probability of $1 - p$. The question is how the distress probability would change if the two banks became integrated. To keep things simple, we treat both banks as identical, except that the realizations of their shocks may be different. If the two banks are integrated, their shock absorption capacity doubles (they have twice as much equity capital as before). Hence, the integrated entity is in distress if and only if

$$S_A + S_B > 2s^*.$$

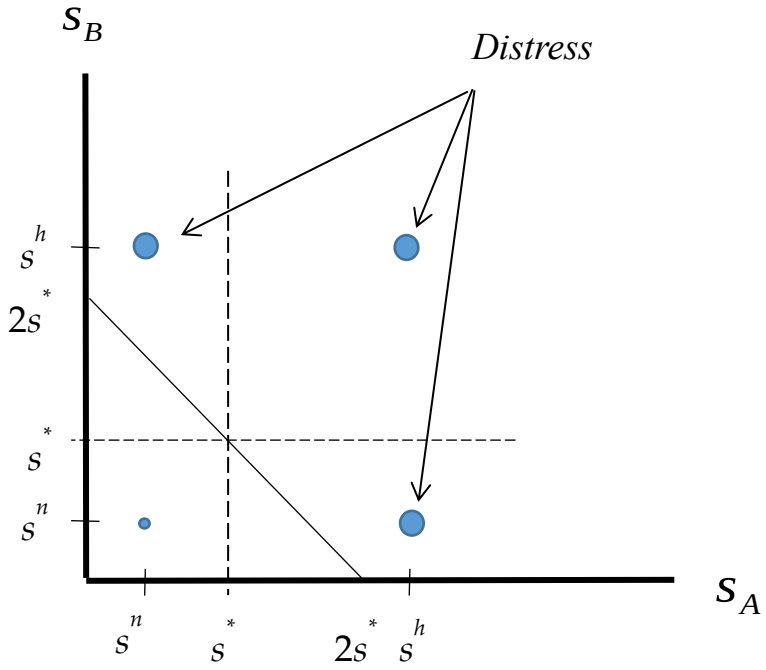
Figure 1 illustrates the combinations of realizations of shocks for which the integrated entity will be in distress. As can be seen from Figure 1, the integrated bank will be in distress only when both shocks are high, and will not be in distress otherwise. Importantly, the integrated bank can avoid distress when one of the two entities experiences a high shock, but the other one does not. This captures the benefit of diversification: when one entity experiences the high shock, the integrated bank can avoid distress, because it can employ the unused resources in its other part when that experiences only a normal shock. The overall effect is that the distress probability of bank *A* drops (from $1 - p$ to $(1 - p)^2$ if shocks are uncorrelated across banks *A* and *B*) as a result of integration.

Figure 1: Diversification case



It should be noted that the above conclusion about the benefit of diversification depends entirely on the value of s*. In particular, the conclusion is turned on its head, when s* is smaller than $(s^h + s^n)/2$. This case is illustrated in Figure 2.

Figure 2: Contagion case



Now the integrated bank is in distress whenever one of its affiliates experiences a high shock. This can be understood as an instance of contagion: even though bank *A*, say, would not have experienced distress when it has a normal sized shock as a stand-alone entity, it may be pulled into distress in an integrated entity when bank *B* experiences a high shock. As a result, integration leads to an increase in the distress probability (from $1 - p$ to $1 - p^2$ if shocks are uncorrelated across banks *A* and *B*).

In other words, whether integration leads to diversification benefits or risk of contagion depends entirely on the threshold at which distress is triggered. Broadly speaking, a low threshold is more likely to lead to contagion while a high threshold allows an integrated bank to take advantage of diversification benefits.[3]

3. Regulatory implications

Regulators are concerned with the risk of bank failures and have revised the regulatory framework since the financial crisis in order to make banks more resilient to adverse shocks. In terms of the stylized example of the previous section, we can think of such regulation as affecting the threshold s^* beyond which a bank will experience distress. Most directly, one can think of a regulator determining capital requirements (or other measures making banks more resilient, such as TLAC or liquidity requirements). The higher the capital requirement, the higher the shock that a bank can absorb before being in distress. While the regulator's objective is to reduce distress probabilities, higher capital requirements arguably come at a cost by reducing the amount of lending to the real economy (see Fraisse, Lé and Thesmar, 2015)[4]. It is therefore realistic to suppose that capital requirements do not reduce the probability of distress to zero. It is therefore realistic to assume, as we do in the example, that even under optimal regulation, $s^* < s^h$.

The first and obvious regulatory implication that comes out of the analysis of Section 2 is that regulators should take into account that integrated banks, such as Bancassurance and Financial Conglomerates more generally, will have different distress probabilities than stand-alone entities. If they benefit from diversification we might expect integration to reduce distress probabilities and to increase them when contagion dominates. From a normative point of view, it would therefore make sense to have lighter capital requirements for conglomerates if they are in the diversification case, but to have harsher capital requirements for conglomerates when we are in the contagion case. Current regulation as in Basle 3 does not provide for a modulation of capital requirements depending on the degree of integration of a bank.

[3] Interestingly, the impact of correlation between the two shocks also depends on whether integration leads to contagion or diversification: under diversification a higher correlation between the shocks increases the distress probability while it reduces the distress probability in the contagion case.

[4] Policy more broadly should not just be concerned with distress probabilities, but overall welfare. Integration decisions not only change distress probabilities, but also the states of the world in which distress occurs, which is an argument we do not take on board here (see, however, Guembel and Sussman, 2017, who show that integration can increase welfare even when it does not affect the probability of distress).

A practical difficulty is, of course, to determine in which configuration a given bank actually is. In principle, it is possible to carry out an analysis akin to the one described in Section 2 for different, and more realistic, assumptions about the distribution of shocks (see Banal-Estanol and Ottaviani (2013) for such an analysis in the context of regular corporations). Doing so, however, requires making specific distributional assumptions and it is in practice difficult to ascertain what the specific distribution of (future) shocks for a given bank is. It is quite possibly this difficulty that prevents significant practical progress in setting different capital requirements for different types of financial conglomerates / stand-alone banks.

The other regulatory implication of the previous analysis is that regulation of capital requirements interacts with regulation that affects integration choices, such as a Volcker rule. In the policy debate, there is little appreciation of such interactions. Instead, rules about integration are developed somewhat independently of the changes in capital requirements. There is a sense that banks were insufficiently capitalized before 2007 and therefore were not sufficiently resilient once a shock hit. Hence, there was a regulatory move towards higher capital requirements. Moreover, there is a sense that the financial system was too prone to contagion, which triggered a move towards ring-fencing financial systems and discouraging conglomerate banks.

However, the previous analysis suggests that contagion and resilience to shocks are tightly linked. The more resilient a stand-alone bank is, the more likely that integrating it with another bank will allow the combined entity to benefit from diversification effects. Arguably, the increase in capital requirements since 2007, together with other measures, have made individual banks more able to absorb shocks, i.e., their distress threshold s^* has increased significantly since 2007. This contrasts with the situation before the financial crisis where s^* was much lower and therefore integration was more likely to generate contagion risks.

In other words, while regulators' concerns with bank resilience and contagion are fully justified, it isn't clear that treating the two as if they were independent is the right reaction. Arguably, an increase in banks' resilience (defined as its ability to withstand shocks) by itself can go a long way in turning the dangers of contagion into potential benefits from diversification. By discouraging integration after having improved bank resilience, regulators arguably forego potential risk reducing benefits of diversification.

Conclusions

This article argues that contagion and diversification can be understood as different sides of the same coin. It also illustrated that the distress threshold, as determined for example by capital requirements, is itself an important determinant as to whether an integrated entity will suffer from contagion or benefit from diversification. The observation that a higher capital requirement leads to diversification becoming the relevant integration factor was used to suggest that regulation aimed at mitigating contagion should not be viewed in isolation from other financial regulation, such as capital requirements. The framework in which the analysis was carried out was very simple. Maybe most

importantly, the distribution of shocks was taken as given. In reality a bank's risk exposures are chosen by the bank itself. It would therefore be interesting to extend the analysis to allow for risk choices to depend upon financial regulation and integration decisions (see, for example, Freixas, Loranth and Morrison, 2007).

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