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Merger wave in a small world: Two views

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ABSTRACT

I attempt a more balanced assessment of mergers in terms of systemic risk versus other effects. First, using the simplest network model, I illustrate how mergers can increase systemic risk by reducing the degree of separation among firms. Then, recasting the firms in a simple economic model that features consumers explicitly, I show how a merger wave – a contagious urge to merge – can occur and what benefit it may bring to consumers. Together, these two models suggest that there is a tradeoff to consider: While a merger wave may result in higher systemic risk, it may also bring about higher consumer welfare.

1. Introduction

During a brief period in 2008, several large US financial firms failed in quick succession. It looked as if a deadly disease was spreading. Surveying the casualties in the aftermath, people found that those firms had interlocked through stock ownership and insurance contracts known as "credit default swaps." The firms had formed a "small world" (Watts, 1999, 2003). In a small world, members are closely linked. The closeness makes them vulnerable to panics and bubbles. A small world entails high systemic risk. People also noticed that those failed firms had grown to be extremely large and complex, through serial mergers. JP Morgan Chase resulted from no fewer than 10 mergers in the two decades prior to the crisis, Citigroup from 9, Bank of America from 14, and Wells Fargo from 12 (Scherer, 2010). The concentration of financial firms had grown enormously as a result.

From these observations, it was but a short jump to the conclusion that the merger waves in recent decades had caused the systemic risk to rise dangerously. Indeed, a vibrant interdisciplinary literature has emerged to address systemic risk in financial markets (Haldane and May, 2011; Gai et al., 2011). The literature emphasizes that systemic risk is inherent in complex financial networks and that merger contagion makes the world smaller and unsafe. Public policies should actively regulate systemic risk by means of tougher rules for consolidations and mergers among financial firms.

This is certainly an important way of looking at merger contagion. But there are other ways. Off balance sheets, firms are interdependent as well. It is possible that, from the point of view of non-financial relations, merger contagion has entirely different effects on the economy. In this paper I look at merger contagion from the point of view of product differentiation.[1] Product differentiation has spatial features that are comparable with those of a network. It is fairly straightforward to depict merger contagion in spatial models, and to show that mergers set products farther apart. As a result, the world can become bigger. It is also easy to show that a bigger world can be better.

In Section 2, using the simplest network model, I illustrate how mergers can increase systemic risk by making the financial world among firms *smaller*. Then, in Section 3, by recasting the merger wave into an economic model, I show how the same set of mergers may increase efficiency by making the economic world *bigger*. In

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[1] The economic literature has identified many effects of mergers: prices, economies of scale, transaction costs, barriers to entry, and innovation (Williamson, 1975, 1987; Scherer and Ross, 1990).

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Section 4, I conclude that merger contagion can present a tradeoff: greater systemic financial risk and greater economic efficiency. Policies toward mergers should take this tradeoff into account.

2. A view from finance

Mergers create systemic risk by linking firms more closely. While the theory of financial networks is growing rapidly and has become very complex itself, its essential message can be conveyed by the most elementary model of the small world. First, however, we should say a word about the nature of the links among firms. From the point of view of systemic risk, a link in a network reflects a degree of interdependence. If one firm should fail, it will increase the risks of failure of those firms to which it is linked. Ownership is a popular definition of a link (Vitali et al., 2011; Kogut and Walker, 2001). Interlocking directorship is another. In the world of financial firms, a link can also be made of "credit default swaps," which are insurance contracts. Firms that buy and sell swaps are interdependent: one large firm's default can impose a large, disproportionate cost on another firm, causing it to default also.

Next, we should say a word about network architecture. Firms in a market may be linked in many different ways. In the real world, "star" is the most commonly observed architecture (Goyal, 2007). In a star, the average degree of connections is low relative to the maximum, and the distribution of the degree of connections is highly uneven (Goyal, 2007; Jackson, 2008). A few firms – often just one – are more connected than others and they are "centers." The first two figures in the following sequence of networks have the star architecture (Figs. 1 and 2).

Each figure in this sequence illustrates a network in a particular phase of the merger wave. In the beginning, when there are four firms, B is the center of a star network. After C and D have merged into CD, B continues to be at the center of a star network. B ceases to be the center when it merges with A.

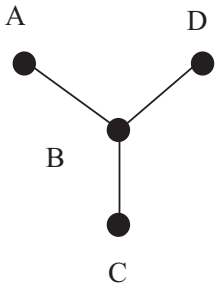

Fig. 1.

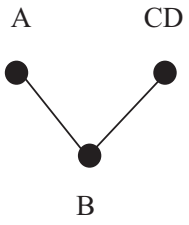

Fig. 2.

Fig. 3.

Table 1
Degree of separation during the merger wave.

	Phase 1	Phase 2	Phase 3
Degree of separation	1.5	1.3	1.0

In the recent financial crisis, AIG was the center of a star network including Morgan Stanley, Bear Stearns, Lehman Brothers, Citigroup, and Bank of America. They bought swaps from each other. The swaps covered trillions of dollars of default. But AIG had those insurance contracts with all the others and had more of them than all the others. In that sense, therefore, AIG was the center of a network.

When it comes to systemic risk, one property of a network is of particular interest: *the degree of separation.* Two firms' degree of separation is the smallest number of links between them. If two firms are directly linked with each other, their degree of separation is 1. If they are linked through another firm, then their degree of separation is 2. And so on. A group of firms also has a degree of separation and it equals the *average* of the various degrees of separation among the firms. A small world has a low (average) degree of separation.[2] If we claim that firms are forming a smaller and smaller world, then we must show a decline in the degree of separation.

Consider those three network figures above again. In each figure, two firms are separated from each other to various degrees, which can be arranged into a matrix. For the three figures, the three matrices are:

	A	B	C	D
A	0	1	2	2
B	1	0	1	1
C	2	1	0	2
D	2	1	2	0

	A	B	CD
A	0	1	2
B	1	0	1
CD	2	1	0

	AB	CD
AB	0	1
CD	1	0

In the first matrix, the average degree of separation equals the sum of all the separations (18) divided by 12 pairs of firms: 18/12 = 1.5. In the second matrix, the average degree of separation equals 8 divided by 6, or about 1.33. In the third matrix, the average degree of separation equals 1.0. In this sequence of networks, then, the average degree of separation declines continuously.[3] See Table 1 for the trajectory. The world becomes smaller after each merger.

3. A view from economics

The small-world story above is extremely important. But it is not the whole story. First of all, it does not explain why mergers take place in waves.[4] A merger wave is a chain reaction. It begins with one merger. The merger triggers still others, and so on. The chain reaction may form a feedback loop, so a firm would be involved in merger many times. Firms become bigger and more complex. Second, the small-world story makes no reference to economic efficiency. Most conspicuously, consumers are missing in it. In this section, I review the sequence of mergers in an economic model. Without taking anything away from the small-world story, I show that what we can learn here is just as important.

A merger wave can occur spontaneously in the spatial model that Hotelling (1929) used to describe product variety. Suppose that the product in question is financial service. The full range of

[2] A small world also has a low average degree of connection. The degree of connection of a firm is the number of links of the firm.

[3] In addition, the average degree of connection declines throughout the process, from 1.5 to 1.3 to 1.0. For example, before merger, the distribution of the degree of connection is {1, 3, 1, 1}.

[4] For an econometric analysis of wave patterns at the industry level, see Luo (2009).