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Risk externalities and too big to fail

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ABSTRACT

This paper establishes the case for a fallacy of economies of scale in large aggregate institutions and the effects of scale risks. The problem of rogue trading and excessive risk taking is taken as a case example. Assuming (conservatively) that a firm exposure and losses are limited to its capital while external losses are unbounded, we establish a condition for a firm not to be allowed to be too big to fail. In such a case, the expected external losses second derivative with respect to the firm capital at risk is positive. Examples and analytical results are obtained based on simplifying assumptions and focusing exclusively on the risk externalities that firms too big to fail can have.

1. Introduction

"Too Big to Fail" is a dilemma that has plagued economists, policy makers and the public at large. The lure for "size" embedded in "economies of scale" and Adam Smith factories have important risk consequences that have not always been assessed at their proper costs or properly defined. The presumption that the manufacturing sector has convex production functions has fueled the growth of enterprises to sizes that may be both too large to manage, and have losses too large to sustain. This is the case for industrial giants such as GM that have grown into a complex and diversified global enterprise that have accumulated costs too large to maintain. This is also the case for banks that are strategically focused and bear risks that are often ignored. Banks draw their legal rights from a common trust, to manage the supply and the management of money for their own and the common good. The consequences of such failures, overflowing into the commons, far outstrip their direct losses. When banks are perceived too big to fail, they have a greater propensity to assume risks, to "rule the commons", price their services unrelated to their costs or quality and exercise unduly their market power.

Size may lead such firms to assume leverage risks that are unsustainable. This is the case when banks' bonuses are indexed to short term performance, at the expense of hard to quantify risk externalities. These risks arise when all costs and benefits are not incorporated by the market. Externality is therefore an expression of market failure. For banks that are too big to fail, these risk externalities are acute. For example, Frank Rich (The New York Times, Goldman Can Spare You a Dime, October 18, 2009) has called attention to the fact that "Wall Street, not Main Street, still rules Washington". Similarly, Rolfe Winkler (Reuters) pointed out that "Main Street still owns much of the risk while Wall Street gets all the profits". Further, a recent study by the National Academy of Sciences has pointed out to extremely large hidden costs to the energy industry—costs that are not accounted for by the energy industry, but assumed by the public at large.

Banks and Central Banks rather than Governments, are entrusted to manage responsibly the monetary policy—not to be used for their own and selfish needs, not to rule the commons, but to the betterment of society and the supply of the credit needed for a proper functioning of financial markets. A violation of this trust has contributed to a financial meltdown and to the large consequences borne by the public at large. In this case, "too big to fail banks" have contributed to an immense negative externality—costs experienced by the public at large. Thus, banks have been endowed with this trust without being

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party to the transactions that have produced such a financial meltdown. If a firm's negative externalities are not compensated by their positive externalities or appropriately regulated, then the social risks can be extremely damaging. In a recent New York Times article (Sunday Business, section, October 4, 2009), Gretchen Morgenson, referring to a research paper of Dean Baker and Travis McArthur, indicated the effects of selective failures, letting selected banks grow larger and "subsidized" at a cost of over 34 Billion dollars yearly over an appreciable amount of time.

A naive optimization to size that does not recognize the nonlinearities of the risks of scale, the risks of dependence they induce and convex their risk externalities, may lead to firms which cannot be economically sustainable [1,2]. Rather, we may experience a risk of blowup. In fact, under any form of loss or error aversion, and concave execution costs, gains from an increase in size should show a steady improvement in performance, punctuated with large and more losses, with a severe increase in negative skewness [3,4].

Under a nonlinear loss function, increased exposure to rare and latent events may have the effect of raising costs of aggregation while giving the impression of benefits — since costs will be borne during rare, but large-impact events. This result is general. It holds not just for economic systems, but for biological, industrial and mechanical ones as well. For example, Fujiwara [5], using an exhaustive list of Japanese bankruptcy data in 1997 (see also Refs. [6–9,4]) pointed out to firms failure regardless of their size. Further, since the growth of firms has been fed by debt, the risk borne by large firms seems to have increased significantly—threatening both the creditor and the borrower. In fact, the growth of size through a growth of indebtedness combined with "too big to fail" risk attitudes has ushered, has contributed to a moral hazard risk, with firms assuming non-sustainable growth strategies on the one hand and important risk externalities on the other. Furthermore, when size is based on intensely networked firm (such as large "supply chains") supply chain risks (see also Refs. [10–12]) may contribute as well to the costs of maintaining such industrial and financial organizations. Saito [13] for example, while examining inter-firm networks noted that larger firms tend to have more inter-firms relationships than smaller ones and are therefore more dependent, augmenting their risks. In particular, they point out that Toyota purchases intermediate products and raw materials from a large number of firms; maintaining close relationships with numerous commercial and investment banks; with a concurrent organization based on a large number of affiliated firms. Such networks have augmented both dependence and supply chains risks. Such dependence is particularly acute in some firms where one supplier may control a critical part needed for the proper function of the whole firm. For example, a small plant in Normandie (France) with no more than a hundred employees could strike out the whole Renault complex. By the same token, a small number of traders at AIG could bring such a "too big to fail" firm to a bankrupt state. This networking growth is thus both a result and a condition for the growth to sizeable firms of scale free characteristic (see also Refs. [9,8]). Simulation experiments to that effect were conducted by Alexsiejuk and Holyst [14] while constructing a simple model of bank bankruptcies using percolation theory on a network of cooperating banks (see also Stauffer on percolation theory [15]). Their simulation have shown that sudden withdrawals from a bank can have dramatic effects on the bank stability and may force a bank into bankruptcy in a short time if it does not receive assistance from other banks. More importantly however, the bankruptcy of a simple bank can start a contagious failure of banks concluded by a systemic financial failure. As a result, too big to fail and its many associated moral hazard and risk externalities is a presumption that while driving current financial policy and protecting some financial and industrial conglomerates (with other entities facing the test of the market on their own and subsidizing such a policy), can be extremely risky for the public at large.

Size for such large entities thus matters as it provides a safety net and a guarantee by public authorities that whatever their policies, their survivability will be ascertained for the greater good and at the expense of public funding. The rationality "too big to fail" is therefore misleading, based on a fallacy that negates the risk of size and does not account for the omnipresent effects of latent, dependent and rare risks as well as their dependent moral hazard and risk externalities.

Scale is neither necessarily robust, in particular with respect to off-model risks. Under loss aversion, the gains from a merger may show a steady improvement in performance, punctuated with large losses, with severe increases in skewness. The essential question is therefore can economies of scale savings compensate their risks. Such an issue has been implicitly recognized by Obama's administration proposal in Congressional committees calling for banks to hold more capital with which to absorb losses. The bigger the bank, the higher the capital requirement should be (New York Times, July, 27, 2009, Editorial). However such regulation does not protect the "commons" from the risk externalities that banks create and the common sustains.

To assess the effects of size and their risk externalities, this paper considers a particular and simple case based on rogue traders' risks and their effects on both a firm's loss and their risk externalities. An example is used to demonstrate that rogue trading or excessive risk taking can have significant impact on a firm risk exposure and on external losses in case of failure — risks that augment significantly, the larger the size of the firm.

2. Too big to fail and hidden risks

Consider the event, known as the Kerviel affair, which we simplify as follows. Societe Generale lost close to $7 Billions dollars, $6 Billions of which came mostly from the liquidations costs of the (hidden) positions of Jerome Kerviel, a rogue trader. In addition, it contributed to external losses that we estimate something around $65 Billions, coming from the liquidation costs of other firms reacting to the meltdown. The former are risks that the bank sustained while the latter is a cost 10 times larger which points out to the systemic risk externalities. These externalities are side effect of the liquidation caused the collapse of world markets by close to 12%!! These extraordinary losses did not put in question the continuity