

How Important Are Hedge Funds in a Crisis?

BY REINT GROPP

Before the 2007–09 crisis, standard risk measurement methods substantially underestimated the threat to the financial system. One reason was that these methods didn't account for how closely commercial banks, investment banks, hedge funds, and insurance companies were linked. As financial conditions worsened in one type of institution, the effects spread to others. A new method that more accurately accounts for these spillover effects suggests that hedge funds may have been central in generating systemic risk during the crisis.

“Continued focus on counterparty risk management is likely the best course for addressing systemic concerns related to hedge funds.”

—Ben S. Bernanke (2006)

During the 2007–09 financial crisis, commercial banks, hedge funds, and investment banks suffered huge losses from investments that were exposed to housing markets. In fact, in 2008 the International Monetary Fund estimated that these types of institutions, along with insurance companies, had lost a combined \$1.1 trillion.

One of the important lessons from the crisis is that systemic risk due to linkages between different types of institutions are significantly underestimated in most widely used risk measures, such as value at risk. Standard measures need to be adjusted to adequately reflect spillover effects among different parts of the financial system. Further, designating which financial institutions are deemed systemically important could depend on identifying to what degree distress in one institution spills over to other parts of the financial system.

However, measuring spillovers effects in practice is difficult for three main reasons. First, spillovers among financial institutions may be quite small in times of financial stability, but large when the system is under stress. Second, it is difficult to distinguish whether a shock affects all financial institutions at the same time or affects only one institution before it is transmitted to other institutions; this is particularly problematic if a common shock affects financial institutions with different intensity and not exactly at the same time. Third, spillovers are typically measured as correlations among the returns of different assets. These calculations suffer from a major disadvantage: Correlations do not identify the direction risk travels between assets. This means that, based on correlations, one cannot judge whether an adverse shock started in institution A and spread to institution B, or the reverse.

This *Economic Letter* reports on a method developed in Adams, Füss, and Gropp (2013) that addresses these concerns. This new risk measurement suggests that, compared with normal times, financial crises amplify the spillover effects among certain types of financial institutions. A surprising finding from this

study is that hedge funds may be the most important transmitters of shocks during crises, more important than commercial banks or investment banks.

Measuring spillover effects

To incorporate spillover effects into a measurement of risk, we first must find a way to measure them. To do this, we develop a statistical model that links the risk in commercial banks, investment banks, hedge funds, and insurance companies. We use the model to estimate the risk in each type of financial institution. We then eliminate the common components that affect all sets of institutions simultaneously in order to focus on stress that flows from one set to another. The model distinguishes which direction these spillover effects flow between pairs of financial institutions. Finally, we estimate the links during both tranquil periods and crisis times.

The results confirm our conjecture that spillover effects appear small during normal times. However, during volatile market conditions such as the onset of the 2007–09 financial crisis, some of the effects dramatically increase in importance. This is true for spillovers from commercial banks to investment banks, as well as the reverse.

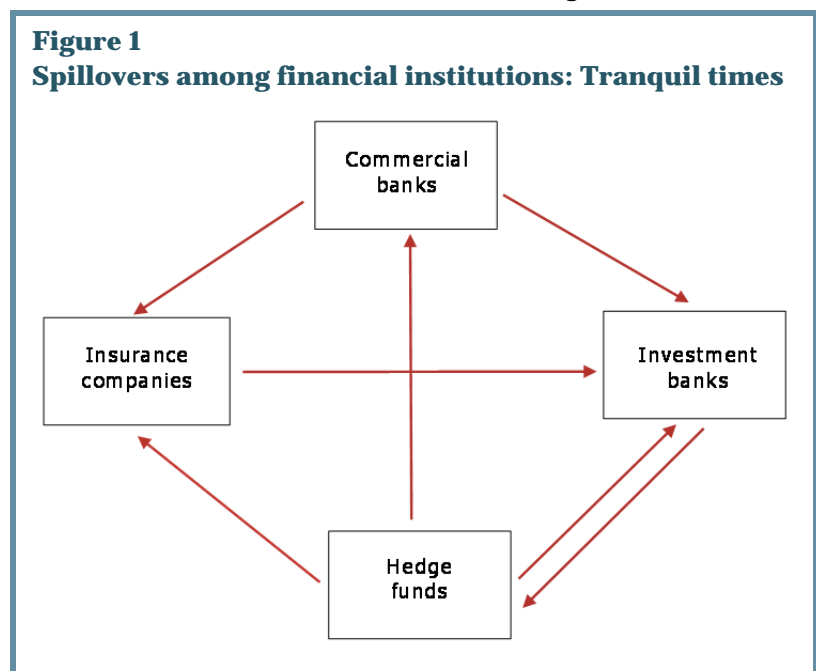
Even though there were prominent cases of insurance companies, such as AIG, that were adversely affected by the crisis, the model suggests that insurance companies are not systemically important in the sense of causing distress elsewhere. Rather, they appear as relatively safe during crises, as their returns tend to be negatively related to the returns of other financial institutions.

Hedge funds, on the other hand, adversely affect all three other types of financial institutions. During crises, the spillovers become very large, making hedge funds more important transmitters of shocks than commercial banks or investment banks.

Why are hedge funds systemically important?

While most observers tend to agree that hedge funds have some systemic importance, there is little agreement on how large a role they play as transmitters of adverse financial shocks. Figures 1 and 2 summarize the model's findings regarding the flow of shocks between different types of financial institutions. In the figures, red arrows correspond to spillover effects; the green arrow in Figure 2 shows positive effects from insurance companies, as mentioned earlier. The thickness of the arrows correspond to the strength of the effects: a thin arrow means that a spillover is statistically significant but economically small, while a bold arrow means it is both significant and economically important.

Figure 1 shows that during calm times the risks emanating from hedge funds



are as small as those from other financial institutions. However, Figure 2 shows that during crisis times, spillover effects increase overall. In particular, hedge funds have economically large spillovers to the other three types of institutions.

Why are the spillovers from hedge funds during financial crises so much bigger, and why do they seem to increase more than those from other financial institutions? Hedge funds are opaque and highly leveraged. If highly leveraged hedge funds are forced to liquidate assets at fire-sale prices, these asset classes may sustain heavy losses. This can lead to further

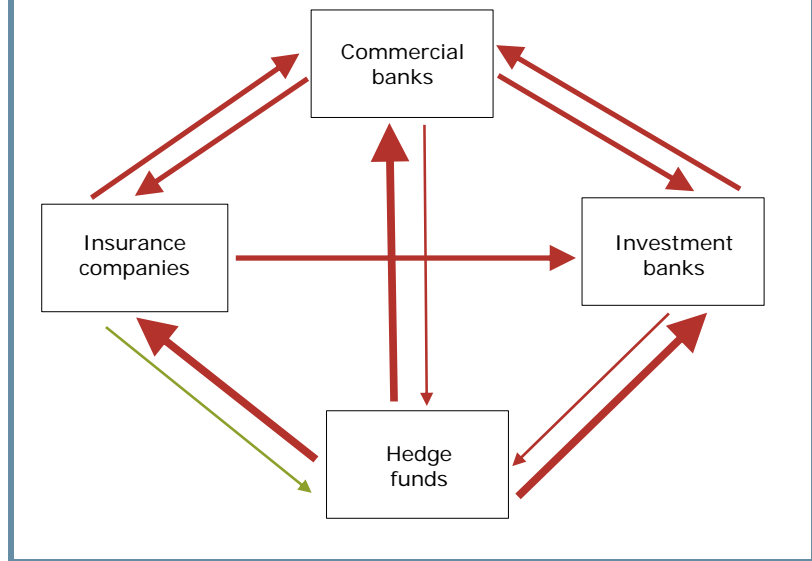
defaults or threaten systemically important institutions not only directly as counterparties or creditors, but also indirectly through asset price adjustments (Bernanke 2006). One channel for this risk is the so-called loss and margin spiral. In this scenario, a hedge fund is forced to liquidate assets to raise cash to meet margin calls. The sale of those assets increases the supply on the market, which drives prices lower, especially when market liquidity is low. This in turn leads to more margin calls on other financial institutions, creating a downward spiral. Another example is investment banks that hedge their corporate bond holdings using credit default swaps. If hedge funds take the other side of the swap and fund the investment by borrowing from the same bank, the spillover risk from the hedge fund to the bank increases. These types of interconnectedness may underlie some of the spillover effects in our study.

In percentage terms, during normal market conditions, a 1 percentage point increase in the risk of hedge funds is estimated to increase the risk of investment banks by 0.09 percentage point. During times of financial distress, however, the same shock increases the risk of the investment banking industry by 0.71 percentage point. It is interesting to compare this risk to spillovers from commercial banks to investment banks. During normal conditions, a 1 percentage point increase in the risk of commercial banks leads to a 0.01 percentage point increase in the risk of investment banks. During financial distress, spillovers from commercial banks to investment banks increase relatively modestly to 0.05 percentage point. Although somewhat higher, this increase from normal conditions to crisis times is much smaller than that for hedge funds. Spillovers from investment banks to other financial institutions show similar results, while insurance companies tend to exhibit small spillover effects, even in crisis times.

How quickly do shocks transmit between institutions?

By using daily data to estimate spillovers, we can use our model to trace the path of shocks through the system, that is, how much time it takes between the initial adverse shock and the peak of its spillover to another set of financial institutions. We show this path by shocking each type of financial institution and observing the responses from the other three types of financial institutions.

Figure 2
Spillovers among financial institutions: Crisis times



During normal market periods, the spillover effects are so small that there is no observable response. However, during more volatile market conditions, the effects from shocks are striking, particularly those from shocks to the hedge fund industry. Adverse conditions in hedge funds increase the risk in all other types of financial institutions, even when shocks to other industries remain small. During crisis times, shocks from hedge funds have substantial effects on all three other types of financial institutions we study. The largest impact appears to be on investment banks, which experience a spillover response around three-quarters the size of the initial shock to the hedge fund industry. When we consider the responses of the shocks over time, we find that the spillover effects from hedge funds are largest after 10 to 15 days. After about three months, the spillover from hedge funds to other financial institutions subsides.

Conclusion

Linkages between different types of financial institutions complicate how overall risk in the financial system is measured. Adverse shocks can affect institutions directly or they can spill over from other institutions. We develop a new approach to measure these spillover effects that has some advantages over the approaches used in the past. We estimate the effects for commercial banks, investment banks, hedge funds, and insurance companies using daily data. We find that both the size and the duration of risk spillovers among financial institutions change markedly depending on whether the financial markets were in normal times or in crisis. Risk spillovers from a shock to one type of institution are small during normal times, but can be considerably larger during crisis times.

It is important to emphasize that, in contrast to the existing literature, the approach described in this *Letter* can delineate between common shocks that simultaneously affect all institutions and pure spillover effects from one type of financial institution to another. Comparing results from this method with standard correlations, we show that standard approaches may overstate spillovers in normal times and understate spillovers in volatile times. Most importantly, we find that hedge funds may play an even more prominent role in transmitting shocks to the rest of the financial market, and thus may amplify systemic risk more than previously thought.

Our model focuses on statistical relationships but does not *explain* the mechanisms underlying the estimated spillovers. To trace spillover effects back to economic relationships rather than statistical ones, one would need much more detailed information on how much risk different financial institutions are exposed to, their assets, and their liabilities. Unfortunately, this type of information is not available for the hedge fund industry. However, there is a growing recognition that hedge funds are systemically important. For example, the initiatives in Lo (2008) call for hedge funds to provide more information to regulators on a confidential basis, including leverage, liquidity, counterparties, and holdings. This could enable supervisors to more accurately assess the overall level of risk in the financial system. Concerns over the systemic importance of hedge funds also underlie the tighter reporting requirements for large institutions in the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. Our findings support these initiatives as a way to improve the measurement of overall risk in the financial system.

Reint Gropp holds the House of Finance endowed Chair of Sustainable Banking and Finance at Goethe University, Frankfurt, and is a visiting scholar at the Federal Reserve Bank of San Francisco.

References

- Adams, Zeno, Roland Füss, and Reint Gropp. 2013. "Spillover Effects among Financial Institutions: A State Dependent Sensitivity Value at Risk Approach (SDSVar)." Forthcoming, *Journal of Financial and Quantitative Analysis*.
- Bernanke, Ben. 2006. "Hedge Funds and Systemic Risk." Speech at the Federal Reserve Bank of Atlanta's 2006 Financial Markets Conference, Sea Island, GA, May 16.
<http://www.federalreserve.gov/newsevents/speech/bernanke20060516a.htm>
- International Monetary Fund. 2008. *Global Financial Stability Report*, April.
<http://www.imf.org/external/pubs/ft/gfsr/2008/01/pdf/text.pdf>
- Lo, Andrew W. 2008. "Hedge Funds, Systemic Risk, and the Financial Crisis of 2007–2008." Written Testimony. Prepared for U.S. House of Representatives Committee on Oversight and Government Reform.
<http://oversight-archive.waxman.house.gov/documents/20081113101922.pdf>

Recent issues of *FRBSF Economic Letter* are available at
<http://www.frbsf.org/economic-research/publications/economic-letter/>

2014-08	Age Discrimination and the Great Recession http://www.frbsf.org/economic-research/publications/economic-letter/2014/april/age-discrimination-older-workers-great-recession/	Neumark / Button
2014-09	Career Changes Decline during Recessions http://qa.frbsf.org/economic-research/publications/economic-letter/2014/march/career-change-decline-recession/	Carrillo-Tudela / Hobijn / Visschers
2014-08	Stress Testing the Fed http://www.frbsf.org/economic-research/publications/economic-letter/2014/march/federal-reserve-interest-rate-risk-stress-test/	Christensen / Lopez / Rudebusch
2014-07	Private Credit and Public Debt in Financial Crises http://www.frbsf.org/economic-research/publications/economic-letter/2014/march/private-credit-public-debt-financial-crisis/	Jordà / Schularick / Taylor
2014-06	Fed Tapering News and Emerging Markets http://www.frbsf.org/economic-research/publications/economic-letter/2014/march/federal-reserve-tapering-emerging-markets/	Nechio
2014-05	State Hiring Credits and Recent Job Growth http://www.frbsf.org/economic-research/publications/economic-letter/2014/february/job-growth-state-hiring-credits-employment/	Neumark / Grijalva
2014-04	When Will the Fed End Its Zero Rate Policy? http://www.frbsf.org/economic-research/publications/economic-letter/2014/february/zero-interest-rate-investor-expectations-liftoff-monetary-policy/	Christensen
2014-03	Job Uncertainty and Chinese Household Savings http://qa.frbsf.org/economic-research/publications/economic-letter/2014/february/job-uncertainty-china-household-savings-state-owned-enterprises-iron-rice-bowl/	Liu

Opinions expressed in *FRBSF Economic Letter* do not necessarily reflect the views of the management of the Federal Reserve Bank of San Francisco or of the Board of Governors of the Federal Reserve System. This publication is edited by Anita Todd. Permission to reprint portions of articles or whole articles must be obtained in writing. Please send editorial comments and requests for reprint permission to Research.Library.sf@sf.frb.org.