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In This Issue

What is a Good Risk Measure?

Choosing a proper risk measure is of great regulatory importance, as exemplified in the Basel Accords, used for setting capital requirements for financial institutions. Currently there are a lot of debates on what risk measures are good for regulating the finance industry. In “On the Measurement of Economic Tail Risk,” S. Kou and X. Peng provide a decision-theoretic and statistical foundation for the subject. They show that the only risk measure that satisfies a common set of economic axioms and is suitable for direct statistical backtesting is the median of tail loss distribution called the median shortfall. In addition, they extend the result to address model uncertainty by incorporating multiple scenarios. As an application, they argue that the median shortfall, which is the VaR at a higher level, is a better alternative than the expected shortfall for setting capital requirements in Basel Accords.

When Diversification and Innovation Destabilize Financial Markets

Diversification is one of the cornerstones of risk management and some financial innovations are particularly suited to allow institutions better diversify their portfolios. However, in presence of risk weighted capital requirements and finite asset liquidity, diversification can reinforce feedback effects between bank assets and investment prices leading to complex and even unstable market dynamics. In “When Micro Prudence Increases Macro Risk: The Destabilizing Effects of Financial Innovation, Leverage, and Diversification,” F. Corsi, S. Marmi, and F. Lillo present a simple, yet analytical tractable, model showing that a multivariate feedback between investment prices and bank behavior, induced by portfolio rebalancing in presence of asset illiquidity, can destabilize the dynamics of prices. In fact when the cost of diversification becomes too small, the system of institutions and assets displays a transition from a stationary dynamics of price returns to a nonstationary one characterized by steep growths (bubbles) and plunges (bursts) of market prices.

Liquidity-Caused or Network-Caused Systemic Risk

The complex interconnectedness of the modern financial system binds financial institutions tightly together to an unprecedented degree. They are interconnected directly by holding debt claims against each other (the network channel), and meanwhile they are also bound by the market when selling assets to raise cash in distressful circumstances (the liquidity channel). Through these two channels, failure at one or several institutions due to excessive idiosyncratic risk taking can quickly propagate to a systemic threat. In “An Optimization View of Financial Systemic Risk Modeling: Network Effect and Market Liquidity Effect,” N. Chen, X. Liu, and D.D. Yao develop an optimization formulation to model the risk transmission roles of both effects. Their investigation points out the great potential of market liquidity to cause a system-wide

contagion compared with a more static and limited impact from the network. The effectiveness of some mitigation policies is also quantitatively analyzed.

Efficient Tests of Vulnerability in Interbank Networks

Structure determines cascading behavior in networks, namely the way (negative) shocks propagate from one node to the other through interlinkages. In “Inhomogeneous Financial Networks and Contagious Links,” H. Amini and A. Minca develop efficient tests to determine if a given structure of a financial network is prone to large cascades, based on the spectral properties of the underlying graph. The scope of the applicability is much larger than existing literature, as it allows for a wide variety of financial linkages among institutions, as well as for heterogeneity in the network structure, a signature property of real world financial networks.

The Impact of Liability Concentration on Systemic Losses

How does liability concentration affect systemic losses in financial networks? Can we quantify it and analyze its implications on the propagation of default contagion? Can we develop a robust criterion for comparing networks? In “Liability Concentration and Losses in Financial Networks,” A. Capponi, P.-C. Chen, and D.D. Yao put forward a novel approach to capture liability concentration by applying the majorization order to the exposure matrix characterizing the interconnectedness of the network. It expresses the desired preference by comparing, in the majorization sense, vectors of losses generated by the network nodes. A network is then preferred to another if it results in smaller worst-case, partial and total loss. Our findings indicate that networks with higher concentration are undesirable from a systemic point of view when the financial system is lowly capitalized. We support our theoretical study by an empirical analysis based on banking sector data of the network induced by the eight largest European countries. Our results support regulatory policies of the Basel Committee and suggest to cap gross exposures toward banks with low capital.

Central Clearing of Interbank Liabilities

The settlement of interbank liabilities may force banks to sell illiquid assets at a clearing price that is below their fundamental value. In the paper “To Fully Net or Not to Net: Adverse Effects of Partial Multilateral Netting,” H. Amini, D. Filipovic, and A. Minca study the effect of full and partial multilateral netting of interbank liabilities through a central clearing counterparty on the clearing price of the illiquid asset, bank shortfall and aggregate surplus in equilibrium. They find that aggregate surplus depends on the multilateral netting policy only through the clearing price of the

illiquid asset. Full multilateral netting maximizes the clearing price and thus the aggregate surplus and minimizes bank shortfall. They also illustrate by example that the effects of partial versus full multilateral netting can be strictly adverse, and that no netting can be better than partial multilateral netting.

Risk in Central Clearing of Derivatives

The financial turmoil of 2008 heightened concerns about derivative securities and brought new regulation to the multi-trillion dollar swaps market. The new rules require that many swaps, which were previously traded bilaterally, now be cleared through central counterparties (CCPs). In “Hidden Illiquidity with Multiple Central Counterparties,” P. Glasserman, C. Moallemi, and K. Yuan investigate features of this new market structure. The authors argue that a CCP’s margin requirements, which are its first line of defense against the default of a swaps counterparty, need to account for the market liquidity of the swaps. They then show that a CCP will underestimate the margin it needs to collect if it fails to account for trades at other CCPs: banks that are members of one CCP are often members of multiple CCPs, so the failure of a clearing member is likely to affect multiple CCPs simultaneously, creating a greater impact than any one CCP might anticipate.

The Mathematics of Sharing Large Risk

One lesson learned from the financial crisis is the inadequacy of stand-alone risk assessment for financial or insurance/reinsurance companies. The way how financial agents are connected, either directly through contractual relationships or indirectly through joint exposures to certain risk sources, can severely affect the overall risk of the financial system or insurance market. In “Risk in a Large Claims Insurance Market with Bipartite Graph Structure,” O. Kley, C. Klüppelberg, and G. Reinert employ bipartite random networks to model exemplarily the market structure of risk sharing between reinsurance companies. The mathematical model itself as well as the developed methodology with relevant examples is also interpretable in a framework of common asset holdings from a portfolio management point of view. The specific nature of losses in the reinsurance sector suggests the use of heavy-tailed probability distributions which differ much from the widely known Gaussian distribution, so that extremely large losses can happen with non-negligible probability. Risk is assessed for individual reinsurance companies, for subsystems of companies as well as for the whole reinsurance market using the classical Value-at-Risk approach (as well as the Conditional Tail Expectation) applied to the joint distribution of catastrophe risks as well as the—possibly stochastic—market structure.