



# DebtRank-transparency: Controlling systemic risk in financial networks

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**Nodes in a financial network, such as banks, cannot assess the true risks associated with lending to other nodes in the network, unless they have full information on the riskiness of all other nodes. These risks can be estimated by using network metrics (as DebtRank) of the interbank liability network. With a simple agent based model we show that systemic risk in financial networks can be drastically reduced by increasing transparency, i.e. making the DebtRank of individual banks visible to others, and by imposing a rule, that reduces interbank borrowing from systemically risky nodes. This scheme does not reduce the efficiency of the financial network, but fosters a more homogeneous risk-distribution within the system in a self-organized critical way. The reduction of systemic risk is due to a massive reduction of cascading failures in the transparent system. A regulation-policy implementation of the proposed scheme is discussed.**

Since the beginning of banking the possibility of a lender to assess the riskiness of a potential borrower has been essential. In a rational world, the result of this assessment determines the terms of a lender-borrower relationship (risk-premium), including the possibility that no deal would be established in case the borrower appears to be too risky. When a potential borrower is a node in a lending-borrowing network, the node's riskiness (or creditworthiness) not only depends on its financial conditions, but also on those who have lending-borrowing relations with that node. The riskiness of these neighboring nodes depends on the conditions of their neighbors, and so on. In this way the concept of risk loses its local character between a borrower and a lender, and may become *systemic*. A systemically risky node in a financial network is one that – should it default – will have a substantial impact (losses due to failed credits) on other nodes in the network. Note that this notion of *systemic risk* is different from the risk of not getting paid back, the *credit default risk*.

The assessment of the systemic riskiness of a node turns into an assessment of the entire financial network<sup>1</sup>. Such an exercise can only be carried out with information on the asset-liability network. This information is, up to now, not available to individual nodes in that network. In this sense, financial networks – the interbank (IB) market in particular – are opaque. This in-transparency makes it impossible for individual banks to make rational decisions on lending terms in a financial network, which leads to a fundamental principle: opacity in financial networks rules out the possibility of rational risk assessment, and consequently, transparency, i.e. access to system-wide information is a necessary condition for any systemic risk management. Note that recently an alternative notion for systemic importance of banks for the fluid transmission of credit through the IB market has been discussed in terms of “controllability”<sup>2</sup>.

The banking network is a fundamental building block in our globalized society. It provides a substantial part of the funding and liquidity for the real economy<sup>3</sup>. The real economy – the ongoing process of invention, production, distribution, use, and disposal of goods and services – is inherently risky and introduces a third type of risk, the *economic risk*. This risk originates in the uncertainty of payoffs from investments in business ideas, which might not be profitable, or simply fail. This economic risk can not be eliminated from an evolving economic system, however it can be spread, shared, and diversified. One of the roles of the financial system is to distribute the risk generated by the real economy among the actors in the financial network. The financial network can be seen as a service to share the burden of economic risk. By no means should this service by itself produce additional systemic risk on top of economic risk endogenously. Neither should the design and regulation of financial networks introduce mechanisms that leverage or inflate the economic risk. As long as systemic risk is endogenously generated within the financial network, this system is not yet properly designed and regulated. In this paper we show that, unless a certain level of transparency is introduced in financial networks, systemic risk will be endogenously generated within financial networks. Systemic risk is hard to reduce with traditional regulation schemes<sup>4,5</sup>. By introducing a minimum level of transparency in financial networks, endogenous risk can be drastically reduced without negative effects on the efficiency or volume in the financial services for the real

## SUBJECT AREAS:

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