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Chapter 1 : Adaptation â€" Seattle Public Utilities

Asset managers have often been considered as key drivers behind financial globalization. As they have been both praised as leaders of global financial integration and blamed as originators of financial crises, any understanding of the international financial markets - and financial crises among them - should be based on a thorough understanding of its core actors, i.e. asset managers.

Introducing SRI A big crash will make investors realize how badly they need better ways to understand and track risk. The analysis is also again powered by our Fasanara Analytics team, a proud addition to the Fasanara family this year. Within it, Alessandro Balata was instrumental. Mirco Lamperti, developer at Fasanara Capital, was then helpful in integrating new findings and techniques to our previous studies on quant warning signals. Save it to your desktop, read it on your tablet, or email to your colleagues. How do you assess the vicinity of a major market crash? Do we have the right conceptual framework and tools to monitor the build-up of systemic risks and the approaching of a seismic shift? How can we go about quantifying market fragility and inherent vulnerability of the financial system? In institutional markets and policymaking inner circles, we still think we know how and have it all figured out. In a show of hubris, despite the Great Financial Crisis of , the models used for the task are more of the same, variations of what used to be there before the crisis. This runs counter to ever- recurring empirical evidence: This may be too easy an excuse, a case of astonishing plausible deniability and drop of responsibility, at a time when heavy interventionism in public markets is otherwise perpetuated without remorse, for the better part of a decade now. When we let human nature run wild, led and misled by perverse incentives, it will do as it did invariably across history, stopping at nothing until it crashes. This happens as the industry of institutionalized asset management goes through transformational times and is heavily impacted by a confluence of global macro trends: When it comes to systemic ricks, macro-prudential policymakers have all eyes on the banking sector as the historical culprit of potential faults, but chances are that next time around the largest risks will instead materialize out of the financial market itself we discuss it in this e-Book on pag In present times, systemic risks are emerging properties of a complex dynamic financial network that is going through a secular transformation, and the framework of analysis around them needs a proper updating too. At Fasanara, we try to wrap our heads around it reaching out to the disciplines of Complexity Theory, Systems Theory for clues. A Conceptual Framework The financial network is no different than other complex dynamic systems in physics, ecosystems, geology and social sciences. In so doing, they relate closely to the dynamics of criticality for energy, epidemics, epileptic seizures, extinctions, glaciations, earthquakes, the human brain, the climate. As such, we can learn a great deal from universal properties valid for all of them. Common concepts in Complexity Theory parlance apply to financial markets as much as they do to any of those fields and disciplines: What are the crash hallmarks and how can they help determine a probability of critical transition, the crisis signposts that indicate that system degradation has gone on long enough and a severe rupture approaches in General properties of complex systems in transition offer clues: The Quest For A Quantitative Indicator Of System-level Market Fragility Having laid out the conceptual framework, we now discuss the toolkit for spotting trends in system-level market fragility. The idea is not one of finding a Holy Grail closed-end formula, but rather a technical support in navigation. To build a family of indicators that can integrate a broader toolkit for systemic risk detection. On the basis of what discussed above, we know we have to be on the lookout for signals emerging from the structure of the market itself. The quantitative indicator that follows is then related to the structure of the market, its price dynamics and the behavior of its economic agents. The product consists of three main ingredients: However, their relevance became systemic only in very recent years, and that prevents a full analysis of past crises for validation purposes. Therefore, for the purposes of this introductory note to our models, we have applied the quantitative study to longer standing indexes: Those happen to be also the largest equity bubbles globally and across history, according to most valuation criteria universally accepted.

So, it may help spend time there. Shaky Foundations For Twin Bubbles: The Cliff Is Near The incidental evidence from the graphs is easy to see, and comes in confirmation of our qualitative assessment for the current fragile state of affairs for global risk assets: Nothing to do with the banking system or the leverage in the system although it is higher now than back then! Nothing to do with valuations of global assets although they are more extreme now than back then, and anytime before then , but rather the reason why those valuations got so over-extended, under the push of intense monetary intervention and positive feedback loops with the private investors community investment strategies, buybacks, etc. Using the SRI as a feedback measure helps see how over-extended the market instability has gotten to in recent years. It is interesting to notice the impact of the Trump factor. Heavily expansionary fiscal policy at the end of the cycle, on top of extraordinary global monetary abundance, equated to an infusion of steroids to US risk assets, and had the effect to propel the market system further out into far from equilibrium dynamics, where system instability flashes an intense red. Then, a powerful wind propels you all the way to the center of the lake, far from safe land. As you moved fast, your body weight was not enough to break the ice. But, as speed decreases and gravitational forces set in, and as the weather heats up and the ice melts some more, chances are that â€¦ Trump, if he wins tonight, could send markets higher again, possibly into new altitudes. This would only exacerbate market fragility, as here measured, pushing farther away from safe shorelines. What Is The Ricci Curvature. How Does It Differ From Entropy One of the basic ingredients at the core of our quantitative indicator is the Ricci Curvature, a notion similar to the more widely known quantity called Entropy. Famously, the Entropy in a system measures the rate at which information is generated within it. When representing the market as a network, looking at the interdependence between near nodes, Entropy captures a topological market organization and its changes during periods of market stress. It derives from the Second Law of Thermodynamics, and has been at the core of the Boltzmann equation pages in this presentation. It is an information-based quantity that can be extremely useful in understanding the stability or instability of the market system. However, we think that the Ricci Curvature can be even more helpful. The less-known Ricci curvature is a well-defined mathematical object coming from differential geometry and it plays also an important role in the Einstein equation in the context of general relativity. In its essence, if the market is to be represented by nodes the agents , edges and links the strength of interactions , the Ricci Curvature reflects the interdependence between distant nodes. It can be taken as a geometric proxy measure of financial system instability. To our purposes, the Ricci Curvature can be considered more wide-ranging than Entropy as it considers the market network not only locally but across distant nodes, so in a way more comprehensively to the specific purposes of our search. By taking the average of the sectional curvatures, one has the Ricci curvature. As for the practical applications of our study, we are interested in building an indicator, based on the Ricci curvature, which contains the information on the topology of the network representing the underlying market; more in detail, the idea is to have a dynamical description of how the robustness of the market structure changes in time, and how potential trends pre-crisis emerge. This way, we have an estimate of the systemic risk in the financial system, and in the case of a shock in the market how the market itself would react given its topological network properties. Network Construction Inspired by the relevant literature of complex financial networks Onnela, ; Boginski, ; Tse, ; Sandhu, , we constructed the model of the market structure on which we built our analysis. Generally speaking, a network is composed of nodes and edges also named links connecting them. Below we summarise the relevant steps for the network construction. Secondly, we considered a non-linear transformation of the correlation matrix which returns positive values in the interval , i. Figure 1 shows that this market structure model can distinguish between two opposite extreme situations. While during periods of relative stability the network results to be without cycles known in the network literature as a tree graph , in a crisis the graph and the market that it models is characterised by many cycles: The message, as noted also in studies by Onnela et al. Constructing correlated graphs in a dynamic manner describes the market from a feedback perspective by analysing its topology as opposed to merely an average correlation between any two given pairs of stocks. The topology analysis appears to be relevant to

infer stability properties of the financial system; but also, to go beyond the well-known use of pairwise correlation increase of the average correlation between stocks during crises. In the next paragraph, we briefly introduce the main measures of robustness we have considered, which is the ability to withstand failures and shocks in complex networks, and can give an estimate of the market resilience to shocks. Now we show with a toy example that this idea can be translated in terms of the statistical physics framework. As a consequence of this increased similarity in the distance matrix, the transition probabilities for each node result to be more similar: There is a quantity very well known in statistical physics which keeps track of the uncertainty as a global property of the network or in general of the complex system: Once the transitional probability matrix for a network representing the market structure has been specified, the entropy evaluates the robustness of the whole network by summing over each direct link the transition probability between a node and its nearest-neighbours. As shown in our previous cookie, the dynamical study of entropy can show general trends in the market structure. Additionally, inspired by Sandhu et al. It can infer a geometrical perspective of the network, as it is meant to play a key role in analysing the market structure through the indirect links and its topological properties. Ricci curvature is a well-defined mathematical object coming from differential geometry and it plays also an important role in the Einstein equation in the context of general relativity. By taking the average of the sectional curvatures, one can deduct the Ricci curvature. In the context of complex networks, the discrete analogue of such a concept that can reproduce and distinguish the different sectional curvatures is the Ollivier-Ricci curvature, Ollivier As for this discrete version of Ricci curvature, the lower bound of Ricci curvature is reached in a tree-like graph, while the upper bound in a fully-connected graph, as discussed by Wang et al. The network modelling the market structure is typically in between these two regimes, such that as the financial market gets closer to a financial crisis the Ricci curvature reaches larger values.

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2 Non-performing assets are one of the biggest challenges facing the global banking system, and particularly Indian banks. The extent of the challenge for nationalized banks is that non-action is no.