En route to the next crisis

Lowering crowded trades will reduce systemic risks building up in clearing houses, suggests ***Albert Menkveld***

"Order, gentlemen, order! "

The manager often called the attention of the clerks when any disagreement led to heated conversation. It was all part of the daily six-minute clearing procedure, first established in New York in 1853. Clerks from 60 banks tried to confirm payment obligations. Clerks inside a ring shuffled past clerks outside it. Inside clerks reported the total payment their bank owed to the bank of the outside clerk.

In 1858, James Gibbons described in much colour how the New York Clearing House came to be. The primary reason for the new clearing house was that the number of banks in New York grew from 24 to 60 in just a couple of years. With it grew the complexity of bilateral payments. The porters who cleared New York's trades were almost bumping into each other.

"The Porters crossed and recrossed each others' footsteps constantly; they often met in companies of five or six at the same counter, and retarded [sic] each other; and they were fortunate to reach their respective banks at the end of one or two hours."

The six-minute clearing procedure replaced the porters' long daily hours, but it did something considerably more important. It created transparency and discipline in bank lending. Before central clearing, the only information the public obtained on a bank's health was the quarterly statement. As it was a pre-scheduled release, the banks had an opportunity to "fix it up".

"Deposits were borrowed for a single day. The loans to directors were reduced for a few hours, or jumped over by transit checks through other banks. Any desirable changes, to make a good show out of bad facts, could be carried long enough for a commissioner to administer the oath."

A new law that required banks to publish weekly statements set change in motion. The clearing house vetted the statements as they became part of its records. Weekly changes to the bank's balance sheet as published in the statement had to correspond to payments. Banks effectively monitored one another this way: they had skin in the game. The clearing house constitution stipulated that its members were liable for non-payment by a bank in default.

Clearing house as a systemic node

In 2011, Ben Bernanke, the chairman of the Federal Reserve, emphasised that financial stability strongly depended on the resiliency of clearing houses (Bernanke, 2011). Dodd-Frank in the US and the European Market Infrastructure Regulation in Europe require that standard derivatives be centrally cleared. A modern clearing house effectively ensures that commitments established by the transactions of its members be honoured. Bilateral counterparty risk is therefore removed from the trading process. Such risk was at the heart of the 2008 financial crisis when liquidity suddenly dried up and markets collapsed.

Bilateral risk is taken care of but systemic risk is not removed. It is concentrated in the clearing house, which becomes a high-pressure valve in the financial system: a systemic node. The European Systemic Risk Board made this point most explicitly.

"Structural reforms being promoted across the globe have paved the way for improved risk management throughout the financial system. In particular, the mandatory move to clearing standardised over-the-counter derivatives trades via CCPs [central counterparties] will help to reduce counterparty risk between financial institutions… However, the more prominent role of CCPs will also introduce new systemic risks. Mandatory clearing will turn CCPs into systemic nodes in the financial system, with unknown, but possibly far-reaching, consequences." (ESRB, 2012)

Ironically, in his plea to make the point that a clearing house is systemically risky, Bernanke cited Gibbons to provide historical perspective. It was Gibbons who claimed that the advent of a clearing house made the system safer. But Gibbons thought oversight was possible in a case of 60 banks and their payment duties. The actual clearing procedure was possible as all members fitted in one room: it was a six-minute procedure.

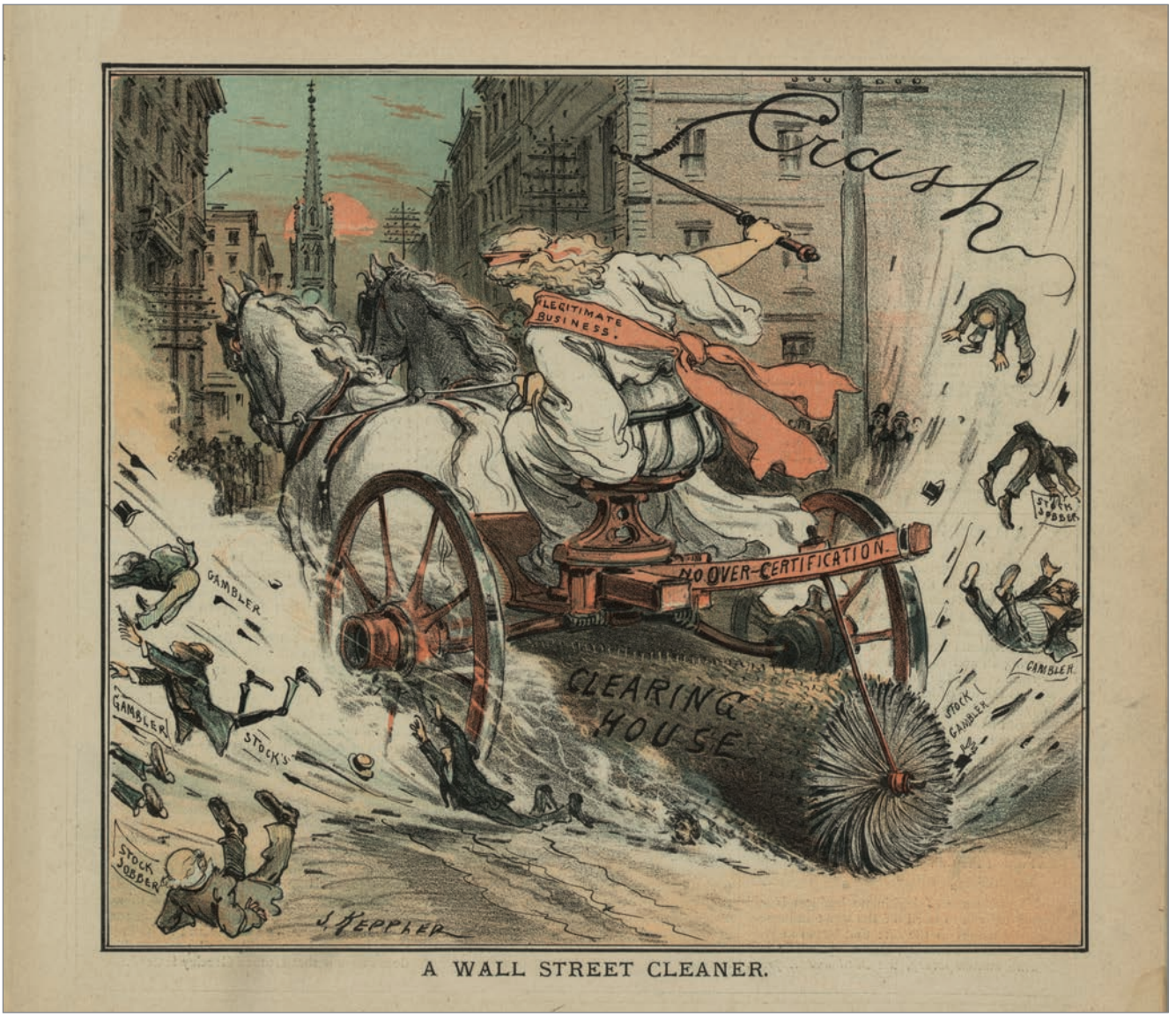
The modern clearing house is a global entity with hundreds of financial institutions as its members. More importantly, these members enter into a range of commitments far beyond relatively straightforward payments. Members trade equity, which is only a commitment to exchange x amount of shares for y amount of money. The actual transfer typically takes place three days after the trade is "completed". Members enter derivative contracts, which are commitments to transfer money in the future, conditional on how the value of an underlying asset changes.

While the task for a modern clearing house might become more difficult, it remains a good idea to centralise counterparty risk in these institutions.Though risks remain, these institutions are also best equipped to manage systemic risk. Acting as a central repository for all institutions' commitments, the clearing house obtains a unique vista on who owes what to whom. It becomes possible to identify institutions that "live beyond their means" relatively early.

One standard way to rein in excessive risk-taking by clearing members is to charge margin based on a clearing member's net commitment. It serves as a "capital requirement" as every unit of risk that an additional commitment contributes needs to be paid for by posting additional margin with the clearing house.

Alternative margin system

The standard approach to calculating margins is to let them scale with the volatility of a member's net commitment. For equity trades, a member's yet-to-clear portfolio is multiplied by the daily volatility in equity returns. Typically some degree of netting is allowed. For example, the daily value change in a $1 million long



A WALL STREET CLEANER.

position in Apple is likely to be partly offset by a $1 million short position in Microsoft. Clearing houses differ in the way they do such netting, but conceptually they do the same thing: the margin scales with the net position times volatility. Examples are the standard portfolio analysis of risk developed by the Chicago Mercantile Exchange and the correlation haircut used by EuroCCP. These approaches are reasonable and robust.

Yet, one major risk to the clearing house is overlooked in the way margins are calculated. They are done member by member. Correlations in value changes across member portfolios are overlooked. These correlations may be small when members trade across many uncorrelated securities. But, they need not be small. In particular, take the case of crowded trades. To keep it a simple, suppose that instead of trading a number of futures with one another , all members trade a single future. Members are either long or short this future in such a way that the risk borne by a single member is unchanged. The total margin collected by the clearing house is therefore unchanged. If there is a sudden large change in the value of this future's underlying, then half of the clearing members' portfolios are under water. They all need to post more variation margin to cover these losses. If capital is low to begin with, the clearing house might now be confronted with multiple members defaulting. The risk becomes systemic.

In a recent report, I propose an alternative margin methodology that accounts for cross-member correlations and crowded trades in particular (Menkveld, 2014). The method defines clearing-house risk as the aggregate loss across all of its members' portfolios. Note that only losses are summed up, not profits. If one sums across both profits and losses then the aggregate is zero, as for every member's trade there is another member who is counterparty to that trade. This is how risk management at the level of a clearing house cannot benefit from off-the-shelf risk management approaches: losses somewhere cannot be compensated by profits elsewhere. This makes risk management an order of magnitude more complicated for a clearing house. The aggregate-loss approach to risk management at a clearing house was first proposed by Duffie and Zhu (2011).

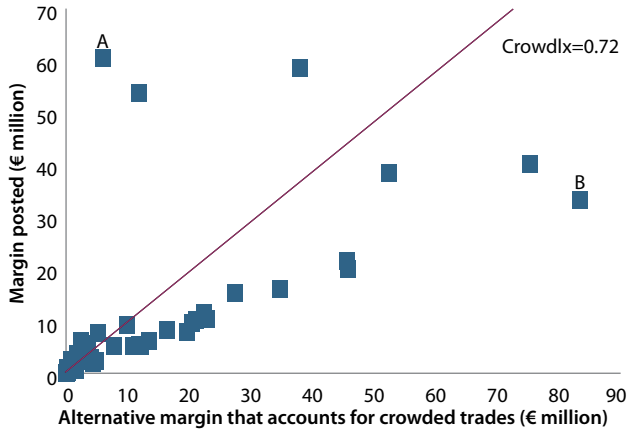
The alternative method I propose bases margins on the value-

at-risk of this aggregate loss distribution. It is therefore focused on extreme outcomes in line with the standard approach to risk management at financial institutions. Mathematical results from long-established models are used to develop analytical results. Margins can thus be calculated without heavy-duty simulations.

Perhaps most appealing is that those who tend to join crowded trades pay more of the aggregate margin required. For each trade, members therefore pay the true shadow cost in terms of clearing-house risk.

The paper implements the approach for trades in Nordic equity markets: Denmark, Finland, and Sweden. The clearing house EMCF, now EuroCCP, kindly made the data available for research. Member identity was anonymised to protect its clients.

1 Actual margin charged plotted against alternative margin



This figure illustrates how margins differ across the two approaches: the clearing house's standard approach of the correlation haircut and the alternative approach that accounts for cross-member correlations. For example, clearing member A posted more than €60 million whereas it should have posted less than €10 million. Member B posted less than €40 million, but should have posted more than double that amount. Nokia was the crowded trade that day. More than one-fifth of member B's portfolio consisted of exposure to Nokia that day, whereas this stock did not make into the top 10 largest positions for member A. The example illustrates that the way aggregate systemic risk is allocated across member firms matters in practice.

Is it optimal to minimise crowding?

Now that there is an approach to calculate systemic risk and allocate it naturally across all clearing members, a normative question arises: is minimal crowding the best outcome for society? Are trades between members best spread across all available securities? This is a very hard question that requires a general equilibrium model.

Underlying these questions is a trade-off: the size of the default fund a clearing house needs to maintain, against the ability of members to trade at low cost. The latter is achieved by having many intermediaries turn into liquidity providers or arbitrageurs. They use their capital to intermediate between non-synchronous or non-centralised fundamental buyers and sellers.

But if more intermediaries become arbitrageurs, more intermediation capital gets tied up into trades. Less capital is available to help out the clearing house in case of a default. In such case, portfolios inherited from members in default command larger fire-sale losses and the default fund therefore needs to be larger. In a closed economy, members need to be taxed more *ex-ante* to fill the default fund. Therefore, less capital becomes available to the intermediation sector.

I unravelled this knot by solving a general equilibrium model in the tradition of earlier work by Franklin Allen, Darrell Duffie, Douglas Gale and Jeremy Stein (Menkveld, 2013). It turns out evenly spread trades are not the best outcome. Moreover, a crisis is needed every once in a while to compensate those who keep their capital on standby. A clearing house relies on these liquidity "suppliers of last resort" when reselling inherited portfolios in case of default. More standby capital reduces the size of the fire-sale premium it needs to pay in such case.

Conclusion

Perhaps there are two key messages. First, if a financial crisis is defined as multiple-bank default followed by extreme fire sales by a clearing house, then such crisis will occur every once in a while in equilibrium. The most desirable equilibrium features a non-trivial level of crowded trades. Second, the risk associated with any level of crowding can be calculated analytically for some relatively standard assumptions. The approach avoids numerically demanding simulations. This seems appropriate in a world where high-frequency traders have replaced humans. They trade at sub-millisecond speed. It therefore seems prudent to clear at high frequencies as well. Six-millisecond clearing is within reach. ■

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