



Wirecard AG and the potential for improving early credit warnings via detecting hidden accounting frauds

August 18, 2020

- Media sentiment analysis may help detect hidden accounting irregularities
- A quantitative PD model can benefit from risk indicators going beyond conventional structural financial variables

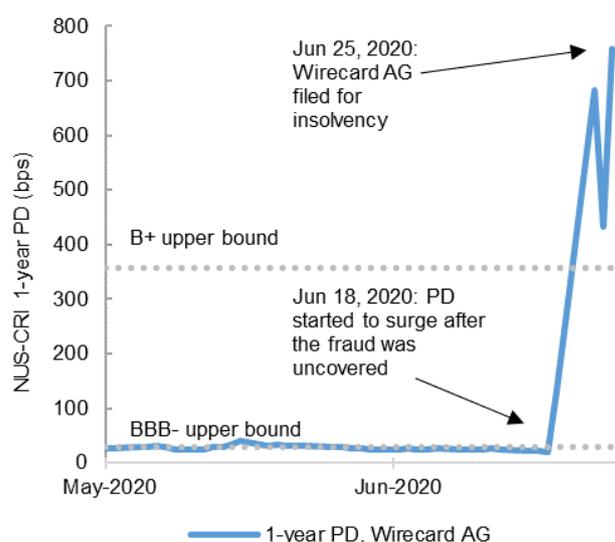


Figure 1: NUS-CRI Agg 1-year PD of Wirecard AG shortly before it filed for insolvency. Source: NUS-CRI.

In Jun 2020, Wirecard AG (Wirecard) shared a piece of jarring news that EUR 1.9bn of cash was missing from their accounts. This red flag attested to many suspicions of financial misstatements by Wirecard, some of which dated back to as early as 2008. What transpired was a near 100% drop in share prices from EUR 104.5 on June 16 to EUR 1.28 on June 17. Stakeholders, including the media, turned to the firm’s executives, internal and external auditors, local and regional financial regulators and credit rating agencies (CRA) to be held accountable. Notably, Wirecard’s financial fraud was framed to be “[hiding in plain sight](#)”.

Referencing the long history of short calls and fraud accusations, it may, at first sight, seem unfathomable that no credit rating agencies took credit actions against Wirecard. As of 2019, Moody’s still classified EUR 500mn worth of the firm’s issuance as Investment grade. Wirecard’s credit quality could already be considered below the investment grade if one simply referenced NUS-CRI’s Probability of Default implied Rating 2.0 (PDiR2.0) bounds back in mid-Mar 2020. However, the credit quality suggested by the NUS-CRI PD model was still far better than the level it reached just before filing for insolvency. The model’s failure to provide adequate advance warning reflects its reliance on structural prediction variables derived from market data and those misleading financials fed by Wirecard. As soon as the artifice was brought to light, the NUS-CRI PD model picked up the signal and reacted with a surge in Wirecard’s 1-year PD during mid-June 2020. Similar cases can also be seen in several default/bankruptcy cases that resulted from fraud. For instance, when looking at the infamous Enron scandal, one could see its PD increasing almost fifty-folds to around 9000bps after Enron restated its financial statements.

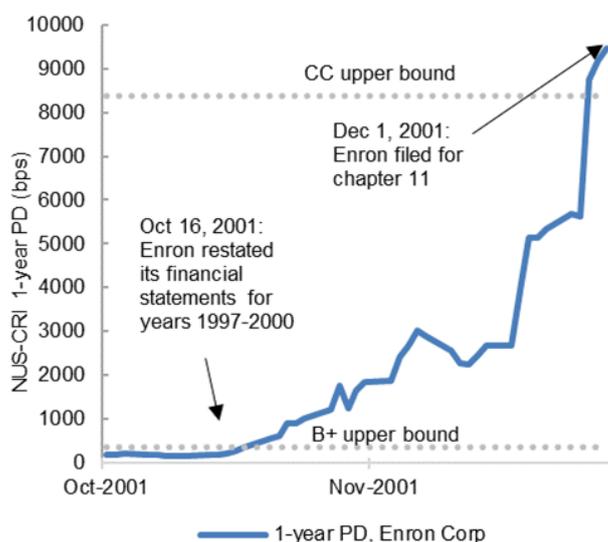


Figure 2: NUS-CRI Agg 1-year PD of Enron Corp shortly before it filed for bankruptcy. Source: NUS-CRI.

The NUS-CRI PD model has generally been able to detect a firm’s credit risk well before the firm’s bankruptcy. To illustrate this, we use the Lehman Brothers’ bankruptcy case as an example. Lehman Brothers, which was heavily reliant on mortgage securitization and sale, was hit hard by the US subprime mortgage crisis which erupted in Q1 2007. The Lehman Brothers reported substantial losses in Q1 and Q2 2008 before filing for Chapter 11 bankruptcy protection on Sep 15, 2008. Figure 3 below displays how the NUS-CRI PD managed to detect the deteriorating credit quality of Lehman Brothers since the 2007 outbreak of the US subprime mortgage crisis, with it having a non-investment grade rating when referencing the PDiR2.0 bounds. In contrast, credit rating agencies still gave Lehman Brothers an A rating right before its bankruptcy filing.

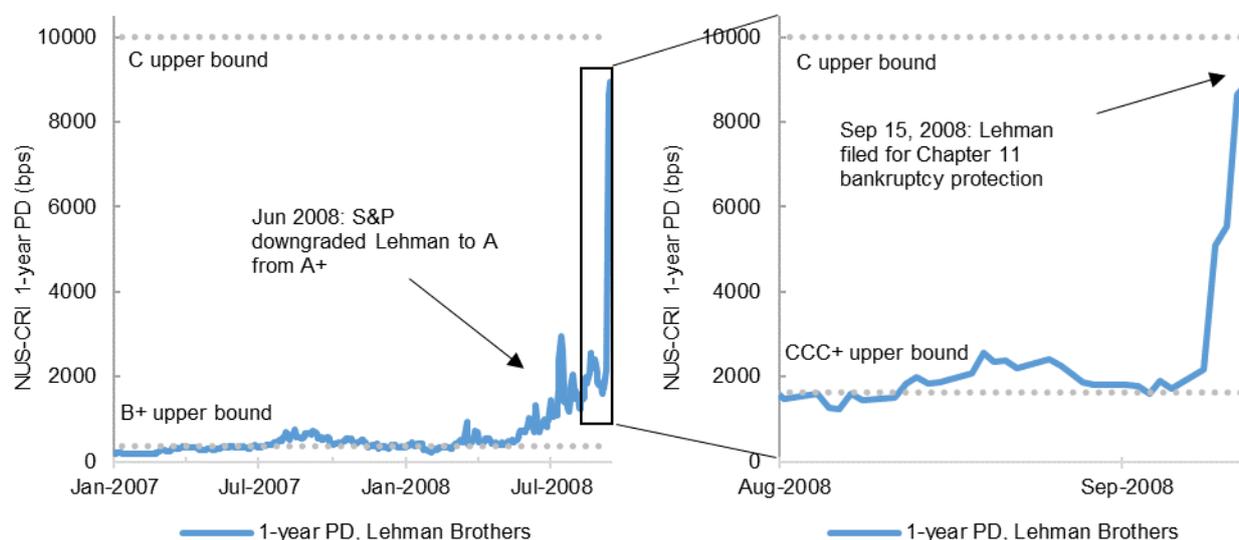


Figure 3: NUS-CRI Agg 1-year PD of Lehman Brothers from 2007 until its delisting with reference to PDiR2.0 bounds. *Source: NUS-CRI.*

From the examples discussed thus far, it is clear that the NUS-CRI 1-year PD managed to reflect the increased credit risks of the firms prior to their bankruptcy. The only difference is the jump in credit risk seems to be much more sudden in cases involving fraud/financial irregularities. Compared to the Lehman Brothers, whose credit quality had already been considered to be equivalent to CCC+ by PDiR2.0 a month prior to its bankruptcy, Wirecard and Enron's credit quality were still equivalent to BBB- and B+ respectively. As the PD model relies in part on information from a firm's balance sheets and income statements, fabricated financial statements will inevitably give rise to grossly misleading credit risk assessments.

The principal-agent relationship in a corporation has become increasingly more complex as executive compensation sees a growing portion of equity. This incentivizes a small set of corporate executives, who has the opportunity and access, to misappropriate value in a self-serving manner. A negative offset of this is well exemplified by the case of [Enron](#). The Chief Executive Officer of the corporation, Kenneth L. Lay, was found to have partaken in financial fraud and insider trading. The initial misstatement of over USD 1.6bn in the balance sheet gave the stock a significant uplift, peaking at USD 140 per share in 2000. SEC revealed that Lay stood to profit [USD 90mn](#) in pay-out from stock gains. Today, the corporate world is not unfamiliar with cases similar to Enron, with infamous names such as [Parmalat](#), [WorldCom](#) and many others that were unveiled during the 2008 global financial crisis.

In light of what is termed to be the "[Biggest Corporate Scandal in Germany](#)", it becomes evident that constructing variables informative of financial frauds via modern means seems to be the only sensible route to achieving better early credit warnings. Ernst & Young was not only awarded with Wirecard's auditing work, its consulting and advisory arms also stood to be well compensated from the firm. This inevitably clouds Ernst & Young's execution in the role of an independent checker of Wirecard as reports noted that they [failed to conduct basic and independent checks](#). The Wirecard episode once again reminds us that reforming the ecosystem of corporate governance and auditing practices has limited effects on eradicating financial frauds and scandals. When corporate governance and other gatekeepers in the complex financial environment today fail us, media and/or social chatters stand out as plausible channels of information worth exploring.

Since the first allegation back in 2008, Wirecard AG had been facing increasing scrutiny and battling [growing questions](#) about the group's balance sheets. Despite the allegations, Wirecard continued to expand its business outside Germany and saw its stock price reaching its peak in Aug 2019. Things began to unravel, however, after the Financial Times published a report about Wirecard's accounting irregularities. Subsequent investigations and reports pointed to the possibility of an accounting fraud. After acknowledging that over EUR 1.9bn in cash is missing, Wirecard filed for insolvency. Had we dug deeper and more systematically into media reports and social chatters, would it be possible to have detected the tell-tale signs that enable earlier warnings on Wirecard's true credit risk profile?

The CRI team launched a research drive to devise a practical way to derive credit risk from relevant news and social media information via natural language processing. The CRI's credit sentiment analysis tool reads each sentence in a news article in which Wirecard is mentioned, assesses its relevance to the credit risk topic and the nature of sentiment expressed. The result of the sentiment is then assigned a value out of five possibilities: -2 (very negative), -1 (negative), 0 (neutral), 1 (positive), 2 (very positive). The scores are averaged over all relevant sentences in an article and then aggregated over articles to finally arrive at an overall score for a particular date. The CRI credit sentiment score at this experimental stage is the 30-day moving average of daily scores. A negative (positive) score indicates a pessimistic (optimistic) overall media sentiment. The preliminary finding on Wirecard during the one-year period leading up to its demise on June 25 is displayed in Figure 4. It appears that the media has already expressed negative sentiments about Wirecard in the second half of 2019. The sentiment became persistently pessimistic after a critical audit by KPMG in Apr 2020 where the firm was unable to verify Wirecard's third-party profit. The usage of a sentiment analysis at least in the case of Wirecard seems to have potential of filling the information gap and complementing the commonly adopted structural financial variables to improve early credit warning.

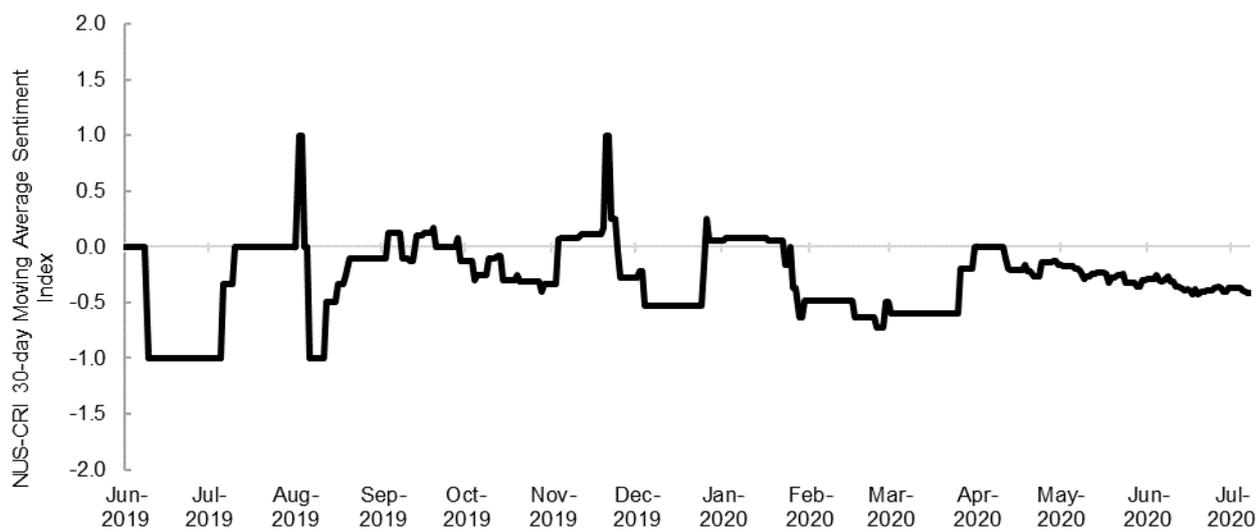


Figure 4: NUS-CRI sentiment analysis on Wirecard AG from Jun 2019 onward. *Source: NUS-CRI.*

Wirecard and other similar cases compel us to search for a better way to detect heightened credit risks in firms that practice false accounting and market manipulation. Admittedly, the current NUS-CRI PD model, relying solely on structural financial variables derived from financial statements and market data, is an insufficient credit assessment tool when analysing cases involving fraudulent accounting practice. Financial frauds, however cleverly conceived, may still leave traces that arouse suspicion and picked up by media reports. The media sentiment score offers a real glimmer of hope that a quantitative system like the NUS-CRI PD model can, in the not-too-distant future, be practically improved upon to detect early credit deterioration that has been purposely hidden by instigators of financial frauds.

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