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Addendum 4 to the CRI Technical Report (Version: 2021, Update 1)

This document updates the Technical Report (Version: 2021, Update 1) and details the introduction of an additional treatment for stabilizing the weight parameter δ in the computation of Distance-to-Default (DTD), which will impact the computation of Probability of Defaults (PDs). The changes have been implemented for the computation of the Distance-to-Default (DTD) starting May 10, 2022.

For DTD computations, a two-stage optimization for the parameters δ and σ are performed. In the first stage, the estimates of δ are unstable due to a limited number of changes in balance sheet items over a course of two years, and therefore, a second stage is implemented to improve stability. Within the same calibration group, all firms in the same sector (based on 12-industry sectors classification under the NUS-CRI 2020 industry classification system) are assumed to share the same δ , chosen to be the average of all individual firm-level estimates.

However, for some small economies, especially in their early years, the average δ is still observed to be unstable due to some sector, or even the whole calibration group, having only few individual estimates of δ . To handle such cases, a threshold rule at each time of estimation is applied under the following conditions:

- If a sector has fewer than 10 individual estimates, the shared estimate of δ will be set to the average of whole calibration group instead of the sector average (i.e., group proxy is used).
- Furthermore, if the whole calibration group still has fewer than 10 individual estimates, the shared estimate of δ is deemed missing.

The implementation of this threshold rule provides some benefits to stabilizing the estimation of δ as group proxy is used when the number of companies for a calibration group-sector is less than 10. However, this implementation may still experience suspicious jumps in δ , especially for those sectors that tend to fluctuate around the 10-company threshold. To be specific, when the number of companies for a calibration group-sector fluctuates around 10 across consecutive months, the estimated δ may switch from the sector average to the group proxy and the other way around frequently, which causes undesirable jumps in δ .

As such, a further smoothing treatment is incorporated to ensure that δ estimates do not jump sporadically based on month-on-month (MoM) changes in sample size on the calibration group-sector level when fluctuating around the 10-company threshold. The new estimate for δ is taken to be a weighted average of the sector average δ_{sector} and the group proxy δ_{group} (i.e. $\delta = \omega * \delta_{sector} + (1 - \omega) * \delta_{group}$), where ω (the weight for δ_{sector}) gradually changes value between 0 and 1 and depends on the fluctuation of the sector size MoM.

The methodology is best illustrated using an example. In month 1, if the number of companies in the sector is below 10, the group proxy δ_{group} is used and $\omega = 0$. For month 2, if the number of companies in the sector increases to above 10, the δ is a weighted average of δ_{sector} and δ_{group} with $\omega = \frac{1}{12}$. If in month 3 the sector continues to have more than 10 companies, ω increases by $\frac{1}{12}$ to $\frac{2}{12}$. On the contrary, if in month 3, the number of companies in the sector drops below 10, ω decreases by $\frac{1}{12}$ to 0. The procedure for determining ω is repeated every month until ω hits 1 or 0. In this way, δ is naturally smoother when the sector size fluctuates around the 10-company threshold.

Impact on δ and DTD

The impact of the new smoothing methodology on δ estimation is evident in the following graphs. The incorporation of this new methodology reduces undesirable jumps that are witnessed in the old non-smoothed methodology.

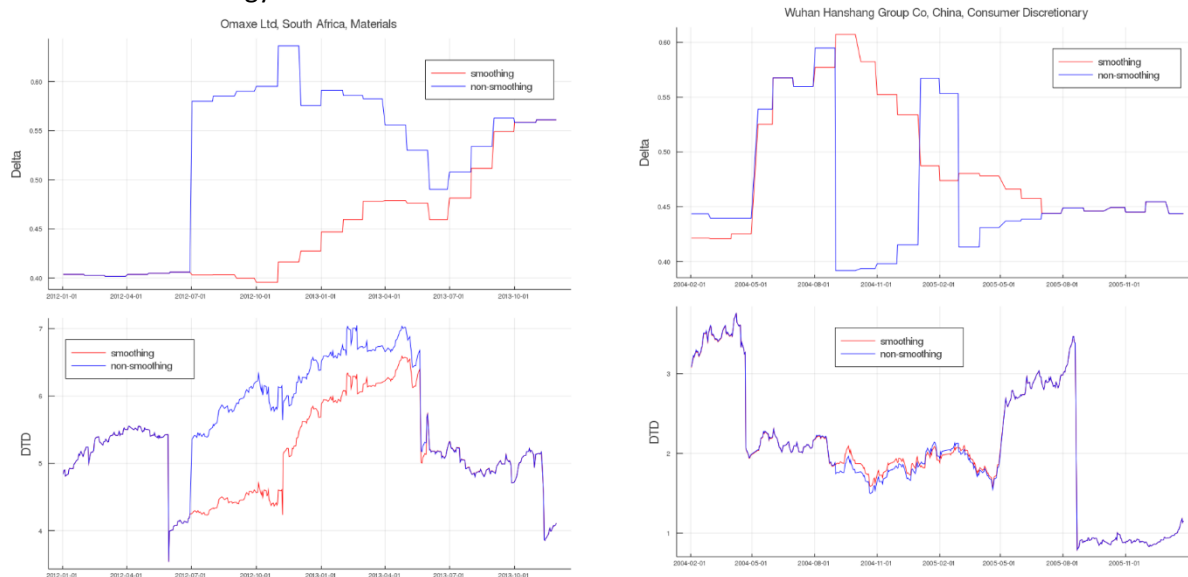


Figure 1: Examples of Delta and DTD estimates with the incorporation of new smoothing methodology

As we can see from the example of Omaxe Ltd above, incorporation of the new smoothing methodology stabilizes the previous sporadic increase in δ , and has a material impact on the DTD value of the company, reducing the sudden jump in DTD value witnessed in Jul-2012. However, as seen from the example of Wuhan Hanshang Group Co., the impact on DTD value for many companies may remain relatively muted due to the amount of other liabilities as a fraction of total liabilities being insignificant to materially affect the DTD value.