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**Addendum 6 to the CRI Technical Report (Version: 2017, Update 1)**

This addendum presents a new treatment for the stock index return used as one of the covariates in the CRI PD model. Specifically, we winsorize the stock index return over the range of [5%, 95%] for the following three groups of economies — Asia Developed (USD), Emerging Market (USD), and Europe (Euro).<sup>1</sup>

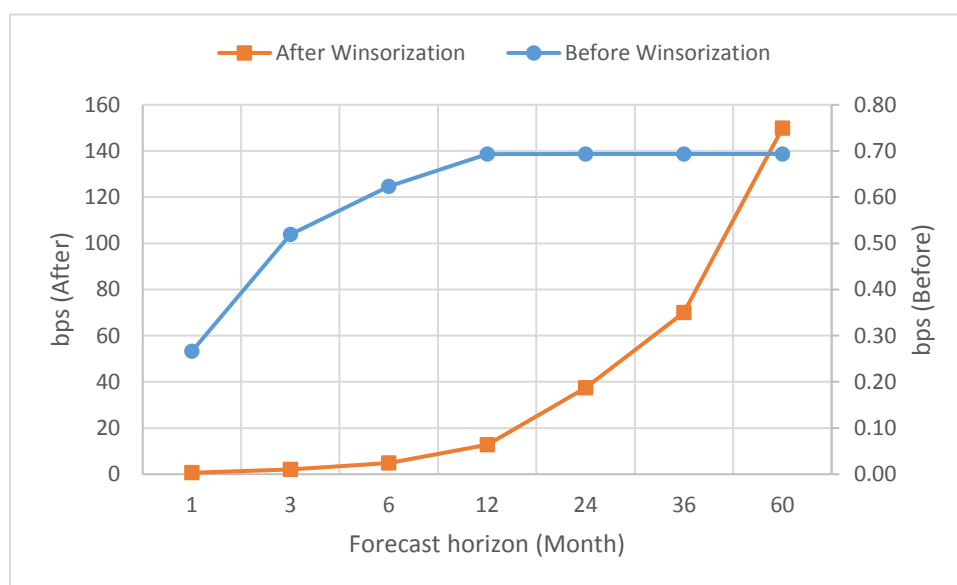


Figure 1. PD Term-structure Comparison for Venezuela. Both PD term structures are as of Nov. 30, 2017.

This additional treatment is motivated by the unusual PD term structure for Venezuela, which becomes flat as forecast horizon increases towards five years (see Figure 1). Here, keep in mind that the term structure should have an upward slope, because the CRI PD is a cumulative PD, and the chances of a default over a longer period are always higher than those over a shorter period.

In the Venezuelan case, the flat term structure is again due to the hyper-inflated stock index return, although it has been partially adjusted for the currency distortion (see Addendum 4). Specifically, the inflated stock index return causes the conditional forward POEs close to 1 and PDs close to 0 at some forward starting times. The cumulative PDs, obtained from those building blocks via the survival-default formula, therefore become almost identical even if forecast horizon gets longer.

To further mitigate the impact of hyper-inflation on Venezuela and other economies, we cap the stock index return at 5% and 95% of its values within a calibration group so as to remove the extremes. For example, the stock index return in Venezuela in November 2017 was 688% before the winsorization treatment, and it becomes 73% afterward. This treatment results in a much more sensible term structure as can be seen in Figure 1.

<sup>1</sup> Since Addendum 4, we have used the unified currency to denominate the market-based variables for all six calibration groups.

## **References**

Credit Research Initiative, 2017, “Version 2017 Update Addendum 4: Changes in covariates in the CRI Probability of Default Model,” National University of Singapore.