Are Models Suitable Under Today's Emerging Risks Environment?

By Manoj Malhotra

Many banks have enhanced their model risk management by adopting relevant supervisory guidance, such as SR11-7[1] and TRIM.[2] However, we live in unprecedented times, with extremely unpredictable events (like the COVID-19 pandemic) having a significant impact on the models being used across geographies.

Today, we are noticing various emerging risks, which could affect every player in the entire value chain – from a manufacturer in China to an end-user in the USA. The Russia-Ukraine conflict, for example, has become a geopolitical crisis, which, in turn, is affecting the global supply chain.

This paper presents an illustrative framework to assess whether mathematical/statistical models, typically used by banks for long-term forecasting horizons, are appropriate under emerging risks. More specifically, it analyzes the effectiveness of CCAR (Comprehensive Capital Analysis and Review) credit loss forecasting models. For such models, we present an illustrative framework through which banks can potentially assess if CCAR models are still appropriate in today's environment of emerging risks.

In principle, other models with long-term forecasting horizons – e.g., IFRS9[3], CECL[4], ICCAP[5], and internal-planning models – could also potentially use such a framework. Models with short-term forecasting horizons – like, say, one-year IRB[6] models – can also use this framework. However, such models with short-term forecasting horizons are expected to be less impacted by emerging risks than models with long-term forecasting horizons, *ceteris paribus*.

Now, let's examine best practices and ongoing challenges in this space.

Breaking Down the Existing Monitoring Framework

One can argue that most banks have established an ongoing monitoring framework. Under the monitoring framework, one should be able to capture deterioration in the model performance, if any, due to emerging risks. However, such an argument has its limitations.

Specifically, one must consider whether metrics, thresholds, monitoring frequency (etc.) align with the existing ongoing monitoring framework. It is a separate debate whether thresholds of such metrics are adequately justified – e.g., for backtesting, what is the rationale for choosing a 20% MAPE[7] threshold?

Moreover, specifically for the stress testing models, can one rely on their output if such models are not suitable under emerging risks, which, by definition, are evolving? Probably not.

Consider an example of a CCAR PD (Probability of Default) model developed using data from 2006 until 2018, with a performance window of 12 months. Given heightened economic uncertainties during the last two/three years (e.g., due to COVID-19, the supply-chain crisis, and developing geopolitical risks), is it prudent to accept forecasted PDs without even holistically reviewing if that model is suitable under emerging risks? Again, probably not.

In summary, although the suitability of the models under emerging risks can be assessed (to a certain extent) using the existing ongoing monitoring framework, it is prudent to adopt a more holistic framework.

Assessing the Suitability of Models Under Emerging Risks: An Illustrative Framework

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[1] Supervisory Guidance on Model Risk Management (refer to link)
[2] Targeted Review of Internal Models (refer to link)
[3] International Financial Reporting Standards
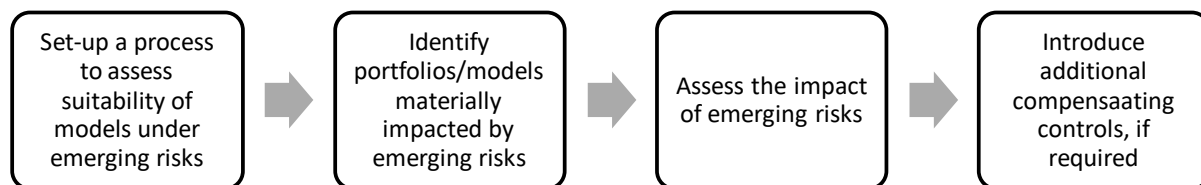[4] Current Expected Credit Loss (refer to link)
[5] Internal Capital Adequacy Assessment Process (refer to link)
[6] Internal Rating Based (refer to link)
[7] Mean Absolute Percentage Error

Figure 1 (below) depicts an illustrative framework to incorporate emerging risks into the models' assessment. The remainder of this section outlines various components of the framework.

Figure 1: Illustrative Framework for Incorporating Emerging Risks into Model Assessment

Set-up a process to assess suitability of models under emerging risks	→	Identify portfolios/models materially impacted by emerging risks	→	Assess the impact of emerging risks	→	Introduce additional compensaating controls, if required

Here's a closer look at the four steps cited above:

1. **Set up a process to identify emerging risks.**

As a first step, banks may establish a process to identify emerging risks. For many banks, established frameworks such as ICAAP could inform such a process.

It is vital to incorporate the feedback of all the key stakeholders (e.g., business, risk) while setting up such emerging risks' identification process. Given the evolving nature of the emerging risks, it is prudent to have a proper governance framework to ensure the sanity of the process (e.g., creating a charter for the forum and having a meeting(s) at pre-specified intervals, etc.). Illustratively, COVID-19 and the supply-chain crisis (due to the Russia-Ukraine situation) are a few emerging risks that may affect various geographies and sets of industries/customers.

2. **Identify portfolios/models materially impacted by emerging risks.**

This is an important part of the risk identification process. For example, while a supply chain crisis triggered by the Russia/Ukraine conflict could arguably affect all industries/customers, it might affect wholesale portfolios more adversely/directly than retail portfolios.

A scorecard-based approach that combines qualitative (e.g., expert's views) and quantitative factors (e.g., portfolio exposure) can be adopted to identify the portfolios that are expected to be materially impacted by emerging risks. This identification of portfolios would lead to the identification of underlying models, which, in turn, should be evaluated further for their suitability under emerging risks.

3. **Assess the impact of emerging risks.**

Once a set of emerging risks and the material portfolios affected are identified, the next step is to assess the potential impact of emerging risks on the underlying models. A few such assessments are discussed below:

One assessment, albeit qualitative, could be to check if model development data contains periods reflective of emerging risks. Illustratively, consider a CCAR PD model, which uses observation data until 31 December 2021 with a performance window of 12 months.

Although it's arguable that the COVID-19 emerging risk is still evolving, it's also possible that the said PD model is somewhat trained using COVID-19-related data. As such, the aforementioned CCAR PD model incorporates one of the emerging risks to a certain extent. Naturally, intricacies are involved in such assessments – e.g., the impact of emerging risks in the historical development data might not be reflected due to idiosyncratic characteristics of the portfolio, given the evolving nature of the emerging risks, how to establish that historical emerging risks are alike future emerging risks, etc.).

Another assessment could be to check for any risk drivers in the model that somewhat capture the emerging risks, either directly or indirectly. Illustratively, consider a CCAR PD model, which uses a version of interest rate as one of the risk drivers. The increasing interest rate could be an emerging risk amidst increasing global economic uncertainty. In such an instance, one can argue to have incorporated the impact of said emerging risk into the existing CCAR PD model.

A simpler example could be a CCAR LGD (Loss Given Default) model, which in most cases will consider interest rate explicitly for computing discounted recoveries and, hence, LGDs. Such a model can easily be customized to incorporate interest rate emerging risk.

As is the case with earlier assessments, there are intricacies involved in this assessment as well (e.g., how to establish that a risk driver would behave similarly under future emerging risks than to how it had behaved under historical emerging risks, etc.).

It is also prudent to assess how the model is performing based on data, which is largely impacted by the emerging risks. Illustratively, it could be argued that 2019 onwards data is somewhat reflective of the COVID-19 period.

If the model has performed well during the COVID-19 period, it could be argued that COVID-19 emerging risk has not impacted the underlying model/portfolio and/or that the model should be expected to perform well in the emerging risk environment, ceteris paribus.

One cannot forget, though, that emerging risks are evolving. To that extent, even though a model's performance might be satisfactory under data partially capturing emerging risks, how can one establish that it is expected to perform well when emerging risks manifest themselves in future?

Sensitivity analysis could assess whether a model is being impacted by emerging risks. *Ceteris paribus*, it could be argued that emerging risks manifest themselves into impacting various macroeconomic variables.

In such a case, if the model is showing adequate sensitivity (or similar sensitivity to that observed during the model development stage) to the macroeconomic variables, it could be argued that the underlying model incorporates emerging risks to a certain extent.

4. Introduce additional compensating controls, if necessary.

All the above assessments could pave the way to informing additional compensating controls (e.g., overlays, recalibration, redevelopment, etc.) to account for emerging risks. Please note that to address existing model limitations/weaknesses, these additional compensating controls are expected, over and beyond the compensating controls already in place,

Naturally, there are complexities involved in establishing a process basis which compensating controls are proposed/applied. For example, is one expected to rely heavily on model performance on the latest data, reflective of emerging risks? Or should similar weight be applied to other assessments? Moreover, how do we ensure that only isolated impact of emerging risks is considered in the compensating controls?

Conclusion

With ever-changing macroeconomic scenarios, new and perhaps unexpected risks are emerging. To that extent, banks must assess the impact of emerging risks on their models, especially models meant for stress testing and/or long-term forecasting purposes.

This paper presents an illustrative framework for assessing the suitability of models under today's emerging risks environment. Naturally, while implementing such a framework, a bank needs to be mindful of a multitude of challenges, and should customize its models, as needed, to align with other internal risk management practices.

Bio

Manoj Malhotra the Acting Head of ERM for Al Ahli Bank of Kuwait (ABK). He is a risk management professional with more than 13 years of banking and consulting experience across all three lines of defense. He has led numerous projects for banks in the U.S., UK, Europe, India and the Middle East in credit risk model validation/development (e.g., CCAR loss forecasting, PPNR, IRB 2.0, IFRS 9 and CECL) and enterprise risk management (ICAAP, stress testing). Prior to assuming his post at ABK, he worked as a director at Ernst & Young.