Which Risk Model Should I Use?

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Chris Shepler, CFA

Mark was a domestic portfolio manager for a well-known asset management company with a heavy emphasis on risk and quantitative controls. He had enough latitude in his mandate to occasionally look outside the US market for opportunities. At first he owned a handful of foreign stocks and over time found himself approaching 20% non-US.

At this point Mark began to wonder if the Barra US equity risk model (USE3L) alone would fully describe the risk of his portfolio, and he began to experiment with alternatives.

At the heart of Mark's situation is the question of whether any one traditional risk model can fit all situations, as if managers could be placed into a neat set of boxes. Below we'll examine a similar portfolio and demonstrate the benefits of using a Custom Integrated Model, recently pioneered by Barra.

Consider a portfolio with 80% US stocks and 20% non-US stocks (American Depository Receipts, or ADRs which trade in the US) set to a common domestic benchmark. Using only the Barra USE3L risk model to analyze this portfolio, one would expect a high degree of exposure and risk to come from the Non-Estimation Universe factor. Unfortunately this factor is difficult to explain and hedge. The Manager also gains no insight into country and currency exposure and risk brought on by owning foreign assets.

Alternatively one could analyze the same portfolio using the Barra global risk model (GEM2L). Figure 1 shows some key findings among style factors common to both models.

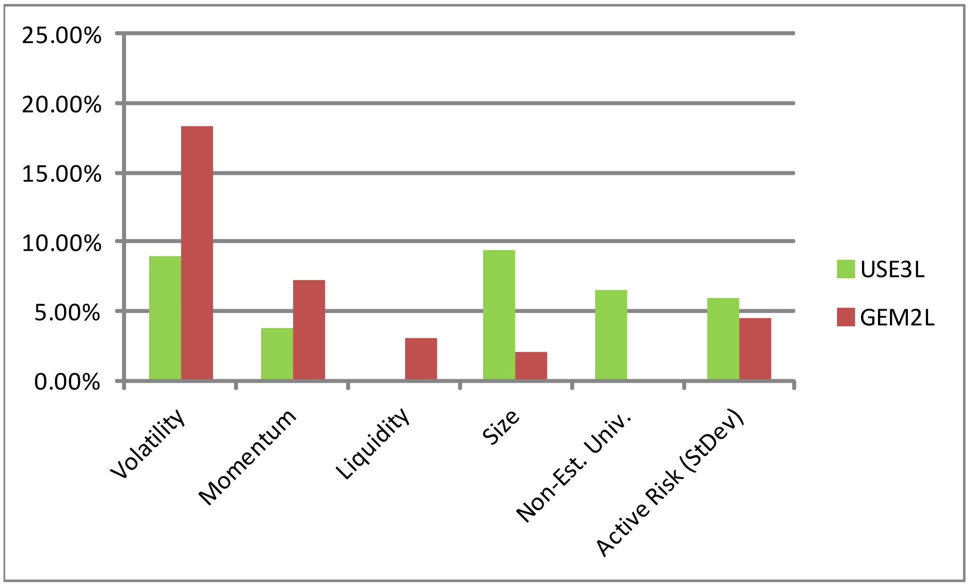

Figure 1: Percent Contribution to Active Risk

As predicted, risk from the Non-Estimation Universe Factor is significant when using USE3L, ranking third among styles behind Size and Volatility. In GEM2L, the top two style factors are Volatility and Momentum. The difference in Size risk is striking, given similar factor descriptors between the two models. In this case USE3L reports Size exposure of -0.78 while GEM2L shows -0.51. This exposure gap is likely due to the fact that GEM2L size exposures are standardized locally, such that the ADRs appear large to GEM2L but not to USE3.

Industries and countries tell a similar story of disparity between the two models. The top five industries ranked in order of percent contribution to active risk for each model are shown in Table 1.

Top 5 USE3L Industries	Top 5 GEM2L Industries	Top 5 GEM2 Countries
Energy Reserves	Oil and Gas Exploration and Production	United States Mkt
Industrial Parts	Oil Gas and Consumable Fuels	China International Mkt
Construction and Real Property	Food Beverage and Tobacco	France Mkt
Drugs	Household and Personal Products	Finland Mkt
Wireless Telecommunications	Health Care Equipment and Services	United Kingdom Mkt

Table 1: Top 5 Industries and Countries

In this case there is virtually no agreement between USE3L and GEM2L as to which industries contribute most to risk. This discrepancy likely stems from the general goal of global risk modeling, which is to broadly describe risk across disparate markets while leaving the details of intra-market correlations to single-country risk models. The country breakdown in GEM2 reflects the 80/20 nature of the portfolio, while USE3 does not have a country view.

So back to our question of which model is more appropriate: the domestic model with a granular view of intra-market correlations or the global model with additional information concerning country and currency. Which industries really are causing the most risk?

The answer may both; in combination the two can provide additional insight. With the recent launch of a new Barra Integrated Model which integrates GEM2 as the global layer, users can now take advantage of the linkages between multiple single country models and with GEM2 itself. This unique structure allows simultaneous analysis of all domestic stocks with their own domestic model, or by combining GEM2 with a number of domestic models in cases where global assets are widely diversified. Of greatest importance, however, is that this model structure incorporates the correlations between the factors in multiple models, enabling a consistent global view of risk which preserves local granularity.

In the 80/20 example above, one can repeat the analysis using a custom USE3L-GEM2L integrated model. All US assets receive exposure to USE3L and all non-US stocks are exposed to GEM2L factors.

Top 5 USE3L Industries	Custom US-GEM Model Top 5	Top 5 GEM2L Industries
Energy Reserves	Industrial Parts	Oil and Gas Exploration and Production
Industrial Parts	Construction and Real Property	Oil Gas and Consumable Fuels
Construction and Real Property	Oil Gas and Consumable Fuels	Food Beverage and Tobacco
Drugs	Specialiy Retail	Household and Personal Products
Wireless Telecommunications	Forestry and Paper	Health Care Equipment and Services

Table 2: Top 5 Industries from according to USE3, GEM2 and a Custom Model

Table 2 reproduces the top 5 industries according to GEM2 and USE3 from Table 1, and it adds the top 5 industries according to the custom integrated model. A manager can now gauge the relative importance of all the local and global industries on the same scale. The custom integrated model retains two of the top five industries according to USE3L and one of the top five according to GEM2L. What makes this breakdown more intuitively convincing is that it takes into account the various correlations between local and global factors in ways that each standalone model cannot.

Next we look back at style risk, this time comparing all three approaches.

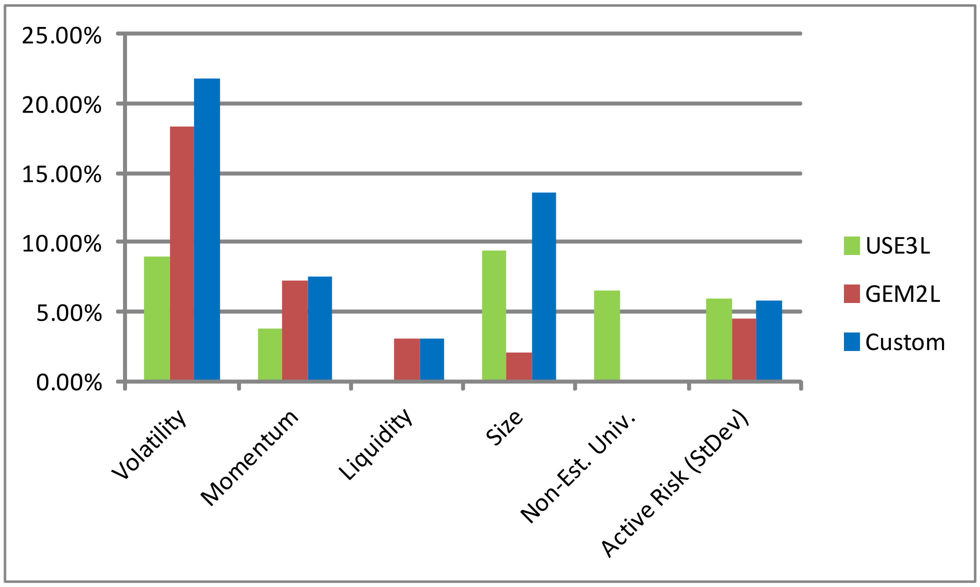

Figure 2: Percent Contribution to Active Risk

Figure 2 reproduces the style risk according to GEM2 and USE3 from Figure 1, and adds style risk from the custom integrated model. Here, the custom integrated model incorporates information from both USE3L and GEM2L, including correlations, to display a new view of style risk. One interpretation is to view the integrated approach as a “tie-breaker” between the two individual models. The theory is that by combining the models one can have a more granular view of risk inside the dominant market (US) while preserving a global perspective where needed. This is particularly acute in the case of the Non-Estimation Universe factor, which is explained by more intuitive factors in the custom approach.

For portfolio managers such as Mark, the availability of custom integrated models offers a unique view of risk. Now managers can combine the granularity of the home country model with meaningful international risk figures from the global model and incorporate information from the correlations between the two. Custom integrated models can be crafted to analyze Developed Markets, Emerging Markets, regional mandates and subsets of these constructions to achieve greater insight into the portfolio management process.

Chris Shepler, CFA, is a Vice President and Equity Portfolio Analytics Product Manager at MSCI. Stacy Cuffe contributed to this article.

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