ERSA Policy Brief

Deriving a theoretically defensible measure of risk

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According to economic theory, risk is a central consideration in financial decision-making. In practice, though, it is difficult to quantify the uncertainty faced by investors, particularly if the aim is to present a risk measure that is consistent with economic theory, is objective and can be replicated.

In "A theoretically Defensible Measure of Risk: Using Financial Market Data from a Middle Income Context" (ERSA Working Paper No. 64), Johannes Fedderke and Neryvia Pillay develop a usable measure of risk, that incorporates broad elements of uncertainty – ranging from political to economic – and which is grounded in theory.

The authors use the much-scrutinised expectations hypothesis, which holds that long-term interest rates are related to expectations of future short-term interest rates, as framework for the extraction of a risk measure. Within this framework, the yields on government bonds are a useful indicator of pure country and market risk, since security-specific risk on government debt can be assumed to be zero.

But does the expectations hypothesis hold?

Employing the expectations hypothesis is not without its difficulties, though. Rigorous empirical testing for the US market does not support the prediction that changes in the yield curve directly reflect changes in expected future interest rates. Using monthly Treasury and government bond yields spanning back to 1981, Fedderke and Pillay similarly find that the central predictions of the expectations hypothesis do not hold for the South African market, either.

Since a crucial assumption of the expectations hypothesis is of a constant risk premium over time, one explanation for this apparent breakdown in the relationship between short-term and long-term interest rates is that the risk premium varies.

Fedderke and Pillay show that a time-varying risk premium is indeed the reason for the rejection of the expectations hypothesis in the South African case.

A critical next step in their analysis is to capture the error terms from the cointegrating vectors used to represent the expectations hypothesis, and using this equally weighted combination of smoothed errors as a risk measure.

How the constructed risk measure stacks up

This derived risk measure, they show, is consistent with the expectations hypothesis – adjusted to allow for a risk premium that varies over time. It also captures the asymmetric nature of shocks. Importantly, the authors also find that this constructed risk measure is consistent with the literature on the history of risk in South Africa.

Risk spikes in 1986 and 1994, for instance, are consistent with a dramatic rise in political uncertainty, while the risk spikes in 2001 and 2004 match the perceived rise in currency risk at the time.

The derived risk measure also stacks up well against various political risk measures put together for South Africa, although it has the advantage of being a broader risk gauge, that extends to economic and currency uncertainty. Additionally, unlike these subjective measures, the derived risk measure is objective, is grounded in economic theory, and can be replicated.

Fedderke and Pillay find that two widely used proxies for time-varying risk– the moving standard deviation of the short-term interest rate, and the spread between the South African and US three-month Treasury Bill rates – behave very differently from their constructed risk measure, suggesting that these proxy measures of risk are unlikely to generate support for the expectations hypothesis.

Encouragingly, scrutiny of the authors' time-varying risk measure shows that the peaks in risk in the South African market have been edging lower over time, implying that the investment climate is improving.