

LEARNING CURVE® STRESS TESTING

The 1990s have provided a wealth of lessons for risk managers. Extreme movements of many interest rates and currencies challenged the rapid advances that risk measurement tools have made. Analysis reveals some patterns—unfortunately, they are of losses that could have been avoided with a better understanding of stress testing's strengths and weaknesses. Stress tests look at what would happen when the unlikely occurs. This article will discuss a few places where stress testing, one popular tool for risk management, may have failed and will suggest ways that this may be prevented in the future.

The significance of stress testing can be seen in the following three examples:

- The 1996 amendment by the **Bank for International Settlements** to the Basle Capital Accord of 1988. To address market risks, a statement was made that a firm using internal models must have a comprehensive stress testing program in place.

- Also in 1996, **J.P. Morgan** released their risk management software package, **FourFifteen**, which includes stress testing capabilities.

- In March 1995, the **Derivatives Policy Group** released the **Framework for Voluntary Oversight**, in which they quantify appropriate stress tests to determine exposure to market risks. Among the specified market movements are yield curve shifts, changes in yield volatilities, changes in equity index values and volatilities, changes in the exchange rate values and volatilities relative to the U.S. dollar, and changes in swap spreads. Differentiations are made for major and minor currencies.

Both JP Morgan and the BIS leave the firm to determine what appropriate shocks to analyze are. The DPG has made specific recommendations that can be tested.

Often, stress tests are performed to establish expected market and credit exposure over the life of an instrument and/or portfolio. For those using the more standard techniques, the question needs to be raised of how comfortable they should be with the tests and their results. For a simple foreign exchange option, perhaps the most relevant band to look at is the one

created by shifts in the underlying, or the exchange rate.

There have been several points in recent history that have tested the bounds of stress tests. One was the devaluation of the Mexican peso and another was the Asian currency crisis. Before the currency began to show signs of wear in Mexico, a reasonable transaction for someone to have entered into may have been a one-year, at-the-money option (strike = 3.33 MXP/USD), entered into June 1, 1994. The DPG recommends testing what would happen given a 20% increase or decrease in the exchange rate for minor currencies. Using mid-prices for June 1, 1994, to calculate the band, and then using historical prices for the subsequent year to find out what actually happened, it becomes clear that once the peso began to float more freely, the original band no longer applied. This is displayed in graph 1. The stress test did not account for policy changes.

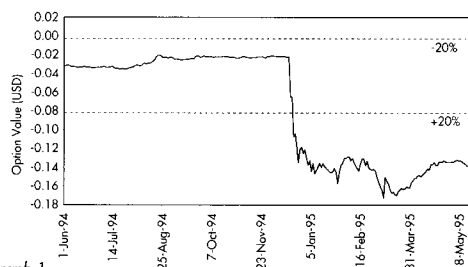
This past July, the Thai government made a similar policy decision by letting the baht float freely for the first time in over a decade. An instrument that may have been entered into before this decision could have been a one-year, at-the-money option (strike = 26.11 THB/USD), entered into February 14, 1997. Applying the same test and method as above, the suggested band for this option again does not withstand a change in policy. This is displayed in graph 2. The option value exits the predicted range almost immediately following the currency being allowed to float.

Sometimes, however, it is not the extreme moves where losses are incurred, but rather the small, subtle shifts in the shape of the yield curve or swap spreads. There are a handful of examples of substantial publicly-disclosed losses due to leveraged interest rate positions in 1994 and 1995 alone. Between April and June of 1994, pre-tax losses of almost USD302 million were reported as a result of leveraged interest rate swaps by companies such as **Procter & Gamble**, **Mead Corporation**, **Gibson Greetings**, **Air Products and Chemicals**, and **Dell Computer**.

A basis swap which is subject to frequent resets is inherently indifferent to such tests as traditionally are prescribed. Positions such as these often fall through the cracks because the change in

MEXICAN PESO

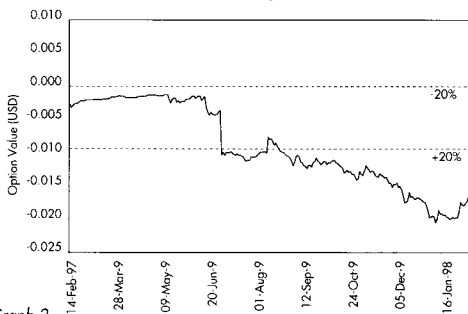
Sell One Year Put Option
Expiration Date: June 1 1995
Strike: 3.33MXP



Graph 1

THAI BAHT

Sell One Year Put Option
Expiration Date: February 14 1998
Strike: 26.115THB



Graph 2

their underlying is not dramatic enough to take note of.

The **Federal Financial Institutions Examination Council** has recently withdrawn their pass/fail constraints placed on potentially high-risk collateralized mortgage obligation investments. The status was previously determined by a series of stress tests performed on CMOs and was created to limit the riskiness of investments. The problem here is that it is difficult to extrapolate from instrument-level stress tests onto portfolios. This is one of the main reasons the regulation has been changed, and the specified tests have been deemed obsolete.

In light of the recent shocks to markets, and current thinking by some regulators, the usefulness of contemporary stress tests needs to be reassessed in most markets. In the case of both the Thai baht and the Mexican peso options, a shock of over 200% would have been required to capture what actually happened. Though we want tests to reflect the worst that could happen, there is a point after which a band becomes so large that it does not mean anything. Without resetting expectations on a periodic basis during the life of a

product, analysis could become meaningless.

An alternative to changing current stress tests could be to look at the structure of contracts altogether. Adapting documentation to address potential problems could prove valuable. A useful tool could be a clause that calls for collateral to be put up once the market value of a transaction leaves the bands created by reasonable tests. In this way, even in the most apocalyptic of scenarios or large concealed changes in marks to market, an element of comfort can be taken in the fact that all will not be lost.

Regardless of how these problems are addressed, it is important to remember that compliance with a list of published tests does not necessarily mean that a portfolio is safe. The most stressful events a portfolio may undergo are not necessarily the extreme moves foreseen. At the same time, it is important to be prepared to handle the stressful events that history, both past and future, provides.

This week's Learning Curve was written by Aliza E. Mezrich, senior analyst from Capital Market Risk Advisors, Inc.