

FROM Barra NEWSLETTER JULY/AUGUST 1993

Are Emerging Markets too Risky for You?

Buy more and reduce risk!

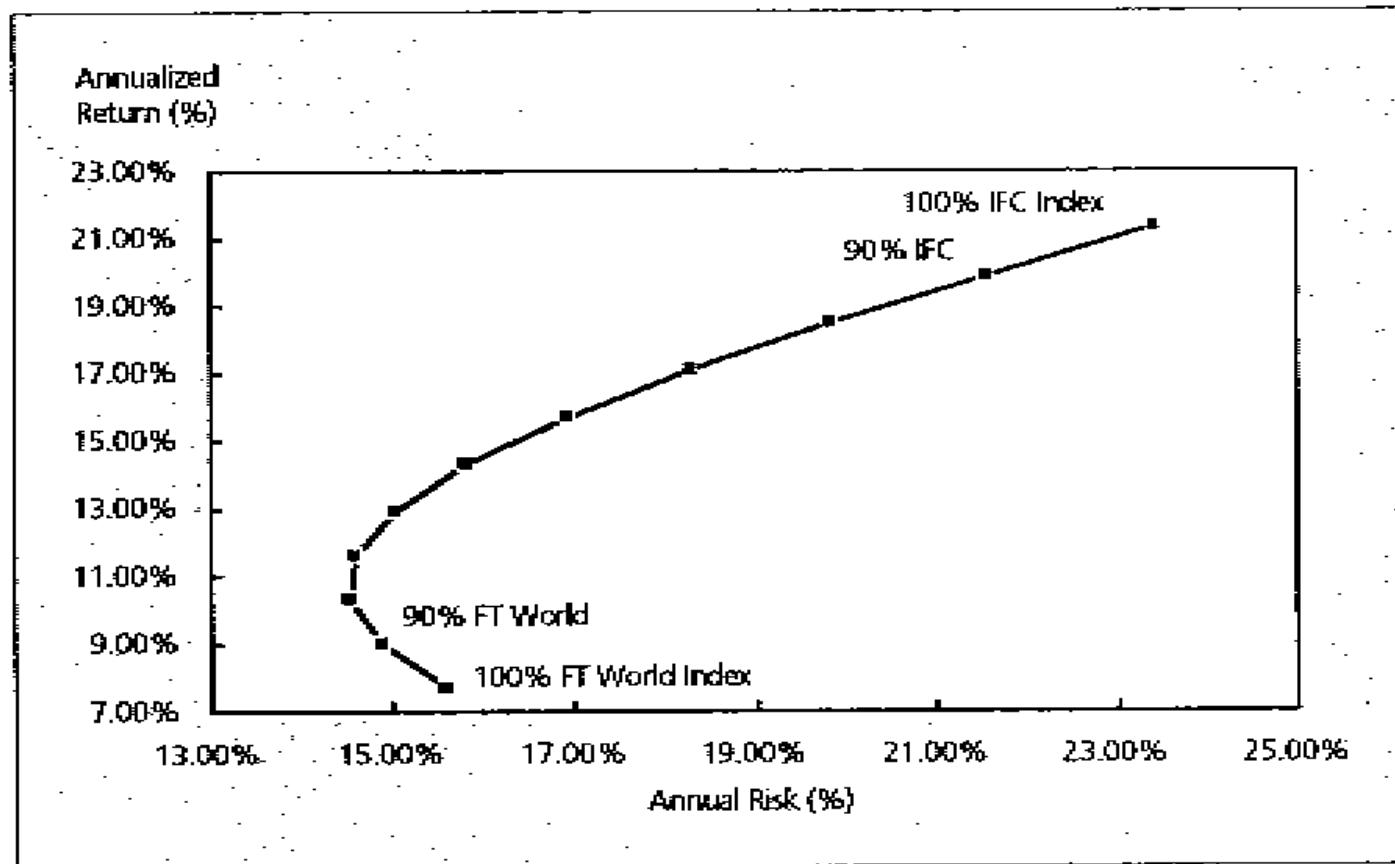
BY ARJUN DIVECHA

Everyone knows that investing in emerging markets is risky. That's only true, however, if you put a large proportion of your money in emerging markets. In the paper entitled "Emerging Markets: A Quantitative Perspective," we show that investment in a well-diversified emerging markets portfolio of up to 50% would have reduced the overall volatility of a global investor's portfolio over the past five years. In this article we propose a methodology to further reduce the risk of a global portfolio--through increased investments in emerging markets!

Modest investments in emerging markets actually reduce risk

Exhibit 1 shows the effect of adding an emerging markets index fund (the IFC Global Index, in this case) to a global portfolio (FT World Index) over the period January, 1988 to December, 1992.

Exhibit 1: Adding Emerging Markets Index to FT World, Jan.'88-Dec.'92



We see that putting 20% of your money into emerging markets not only reduces risk from 15.5% to about 14.5%, but also increases overall annual portfolio return (over the past five years) from 7.69% to just over 10%. In fact, investments of up to 50% in the emerging markets would have reduced risk and increased return relative to the FT World Index. This risk reduction (and return enhancement) is not simply an artifact of the past five years--it is true for any five year (or longer) period since 1985 (when the IFC Index was created).

This analysis assumes that the investor buys an emerging markets index fund; that is, weights countries in proportion to their market capitalization. The results are likely to be true for any well-diversified emerging markets portfolio. Putting all of one's emerging markets assets into one region, such as Latin America, would not result in a well-diversified portfolio. Lacking any other information, how should one allocate money to different countries or regions? Is indexation, using market capitalization weights, the right answer?

Capitalization weighting requires heroic assumptions

The case for weighting countries according to their market capitalization is tenuous at best, even in the developed markets. To weight countries in proportion to their market capitalization, one has to assume that markets are efficiently priced. If markets are not efficiently priced, market weighting leads one to overweight "overvalued" countries (such as Japan in the late 1980s) and underweight "undervalued" countries.

In the emerging markets, where there are severe restrictions on what global investors can buy within each market, market weighting makes little sense, since the definition of what constitutes the market capitalization depends on who you are (local or foreigner) and what is available for you to buy. Furthermore, no market that went from 2,500 to 12,500 in two months and back to 5,000 in three months (as Taiwan did in 1991) can in any way be considered efficient.

In such bipolar markets, would one use the total market capitalization (available to the locals) or just the float available to foreigners to determine each country's weight? These two methods lead to radically different weights for countries such as Korea, Taiwan, and India. Korea forms 14.9% of the IFC Global Index, but only 3.3% of the IFC Investable Index (as of June 1, 1993). The difference between the two indices is that the IFC Global index uses total market capitalization while the IFC Investable index uses the float that is available to global investors.

If market capitalization weighting doesn't make any sense in the emerging markets, what does? One proposed solution is to use GDP weights. The World Bank, however, has recently redefined the GDP of countries based on Purchasing Power Parity (PPP) rather than current exchange rates. This causes the emerging markets (as a group) to go from about 20% of world

GDP to just under 50%. Using this new definition of GDP weighting would require global investors to immediately shift many of their investments from the developed markets to the emerging markets. In short, using GDP weights now requires investors to make a judgment about how GDP is compared across countries (PPP or current exchange rates). The choices they make would cause huge differences in relative weights. Clearly this seems as arbitrary as market weighting.

If not market or GDP weights, then what?

Another proposed solution is to use Low Volatility (LV) weighting. The concept is simple and well-understood because of its relevance in the U.S. equity market. We pick the weights of each country that would create a minimum-variance portfolio, viewed from the investor's numeraire currency. Thus, each country's weight is based on the amount it contributed to lowering the risk of the overall portfolio instead of its market capitalization. Countries that had the lowest predicted volatility coupled with low correlation with other markets would have the highest weight, and those with high predicted volatility or high correlation with other countries would have the lowest weight.

The theoretical basis for such a low-volatility strategy is that the LV portfolio is likely to be close to the efficient frontier. One can forecast volatility with considerable accuracy; thus, a portfolio that is forecast to have low volatility *ex ante* is highly likely to have low volatility *ex post*. If we visualize an efficient frontier chart, we can be reasonably sure that the *ex ante* LV portfolio will be close to the *ex post* minimum-variance point, even if we know nothing about what its return might be. On the other hand, one can make no such assertion about market-weighted portfolios. One can only discover *ex post* whether they were close to the frontier or not. As a result, the LV portfolio is likely to be more mean variance (MV) efficient than the market portfolio.

Thus, while we would expect the LV portfolio to have lower volatility than the market portfolio, we have no *ex ante* forecast of the relative return of one vis-a-vis the other. If in fact the market portfolio is highly inefficient (that is, it is a deep interior point within the feasible set) it's possible that the return to the LV portfolio will be as high as, or higher than, the market portfolio. Numerous researchers² have investigated this phenomenon within the U.S. market; use of a similar LV strategy was the subject of two earlier newsletter articles.³ Their work indicates that in the U.S. market, an LV portfolio would have outperformed the market portfolio while undertaking considerably lower risk.

This weighting scheme, therefore, has the multiple benefits of making sense (from an efficiency point of view), lowering risk (for an asset class whose image is synonymous with high risk), and having the possibility of doing at least as well as the market portfolio (if the U.S. precedent holds).

Such methodology, without any constraints on the weights of each country, results in weights that are either unpalatable or uninvestable, from a global investor's point of view. As with any unconstrained optimization, one needs to be wary that the volatility minimization process does not lead to error maximization. It makes sense to set constraints on country weights based on the true investability of each country and the "prudent person" test (for example, no matter how good India may seem to the optimizer, no prudent person would put 80% of their money there).

A nice idea, but does it work?

We tested out this idea to see how it would have worked over the past five years. To make this a realistic strategy, we used a simple constraint: that each country's weight had to range from 50% to 200% of its market capitalization weight. This ensures that each country will have a weight that is reasonable and investable for the global investor. We chose the numbers, 50% and 200%, quite arbitrarily; for an actual investment the range should probably be tailored to the investability of each country and the risk aversion of the investor.

We used the following methodology to construct the portfolios:

- 1) We chose from all the countries in the IFC Global Composite Index except for Nigeria, Zimbabwe, Jordan, Pakistan, Colombia, Venezuela, and Indonesia. We deemed all of these (except for Indonesia for which adequate data was not available) to be uninvestable and/or uninteresting to the global investor.
- 2) We used the monthly total return, in U.S. dollars, to each market from January, 1985 to December, 1987 (36 months) to form the first variance-covariance matrix. Using this matrix and quadratic optimization, we found the LV portfolio for January, 1988 that met our constraint of 50% to 200% of market weight for each country.
- 3) We held this portfolio for 12 months, until the end of 1988.
- 4) We repeated steps 2 and 3 for each year from 1989 through 1992. At each year-end, we used the previous five years of data to compute the matrix (except for 1988, when only four years were available).
- 5) We then computed the return, in U.S. dollars, to the LV strategy and the IFC Global Index between January, 1988 and December, 1992.

And the winner is ...

Exhibit 2: Cumulative return to LV portfolio and IFC index, Jan. 88-Dec. '92

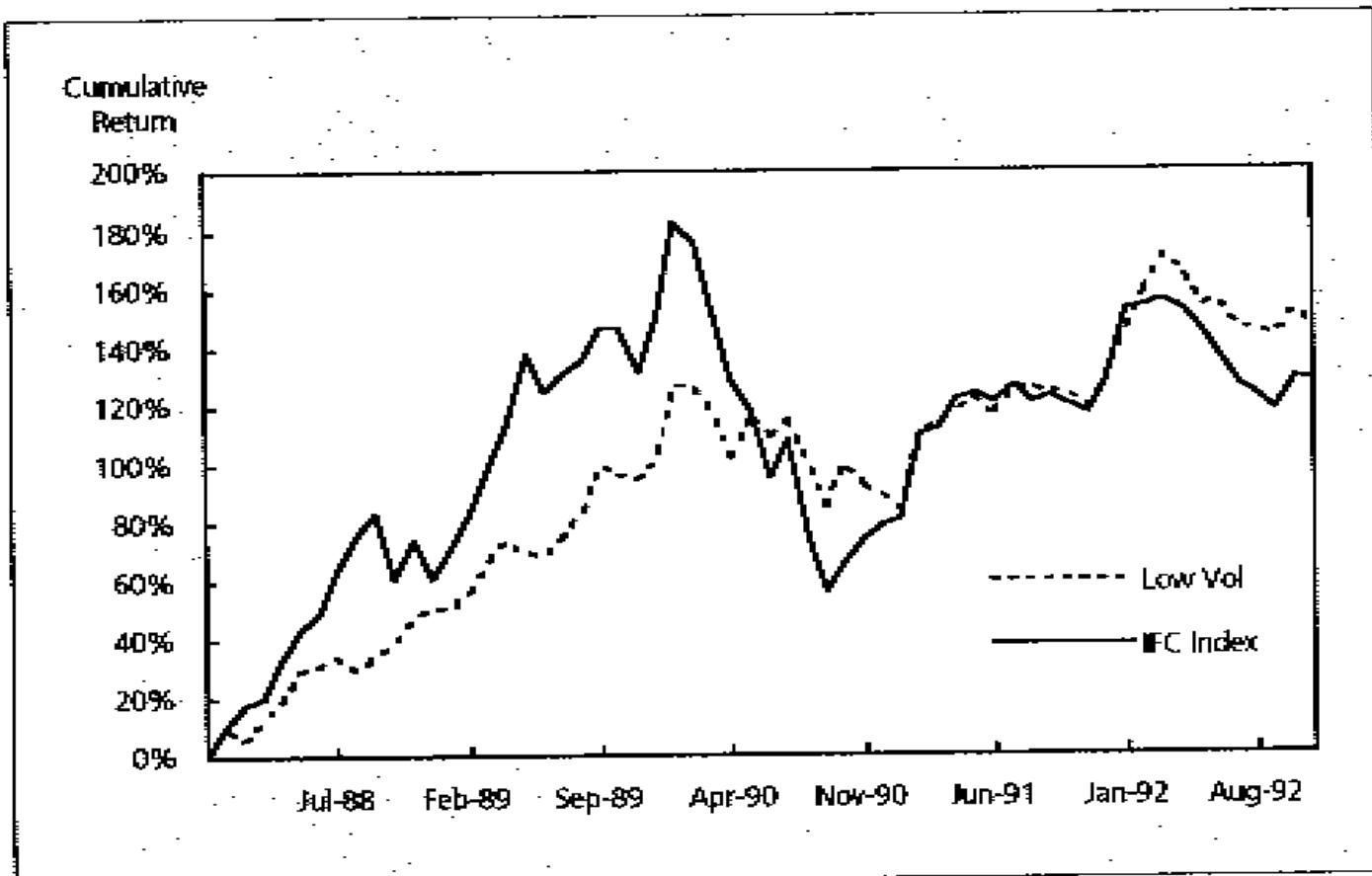
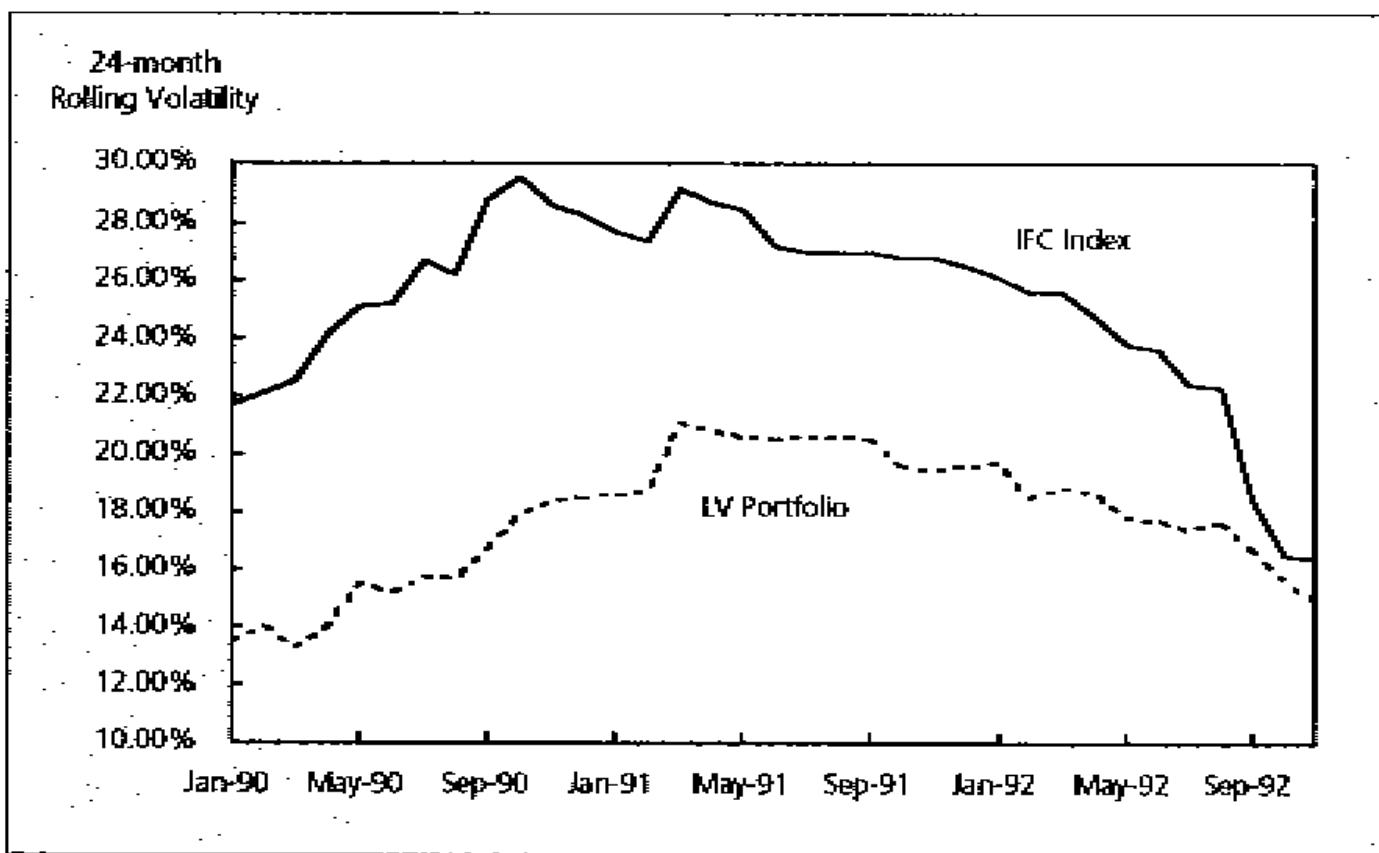


Exhibit 2 shows the results of the simulation. The LV portfolio did indeed have lower volatility than the IFC index, as expected. The finding that the LV portfolio outperformed the IFC index over the same time period is somewhat surprising. This would imply that the IFC index was almost certainly not MV efficient over this period--a further nail in the capitalization-weighting coffin.

Exhibit 3: Realized volatility, IFC and low volatility portfolios, Jan. '90-Dec. '92



We find that the realized volatility (annualized standard deviation of monthly returns) of the LV portfolio over this five-year period was 16.54%, compared to 23.39% for the IFC index. Exhibit 3 shows the 24-month rolling volatility over this time period; clearly, the LV portfolio had lower realized volatility than the IFC index over the entire time span.

The results show that such an LV strategy would indeed have worked over the past five years. In our opinion, one can make a strong case for viewing the LV weights as the baseline for performance evaluation.

More is better

The analysis thus far has focused on how to weight the emerging markets among themselves. Now let's examine the impact of adding the LV portfolio to a global investor's portfolio.

**Exhibit 4: Adding LV portfolio and Emerging Markets index to FT world,
Jan.'88-Dec.'92**

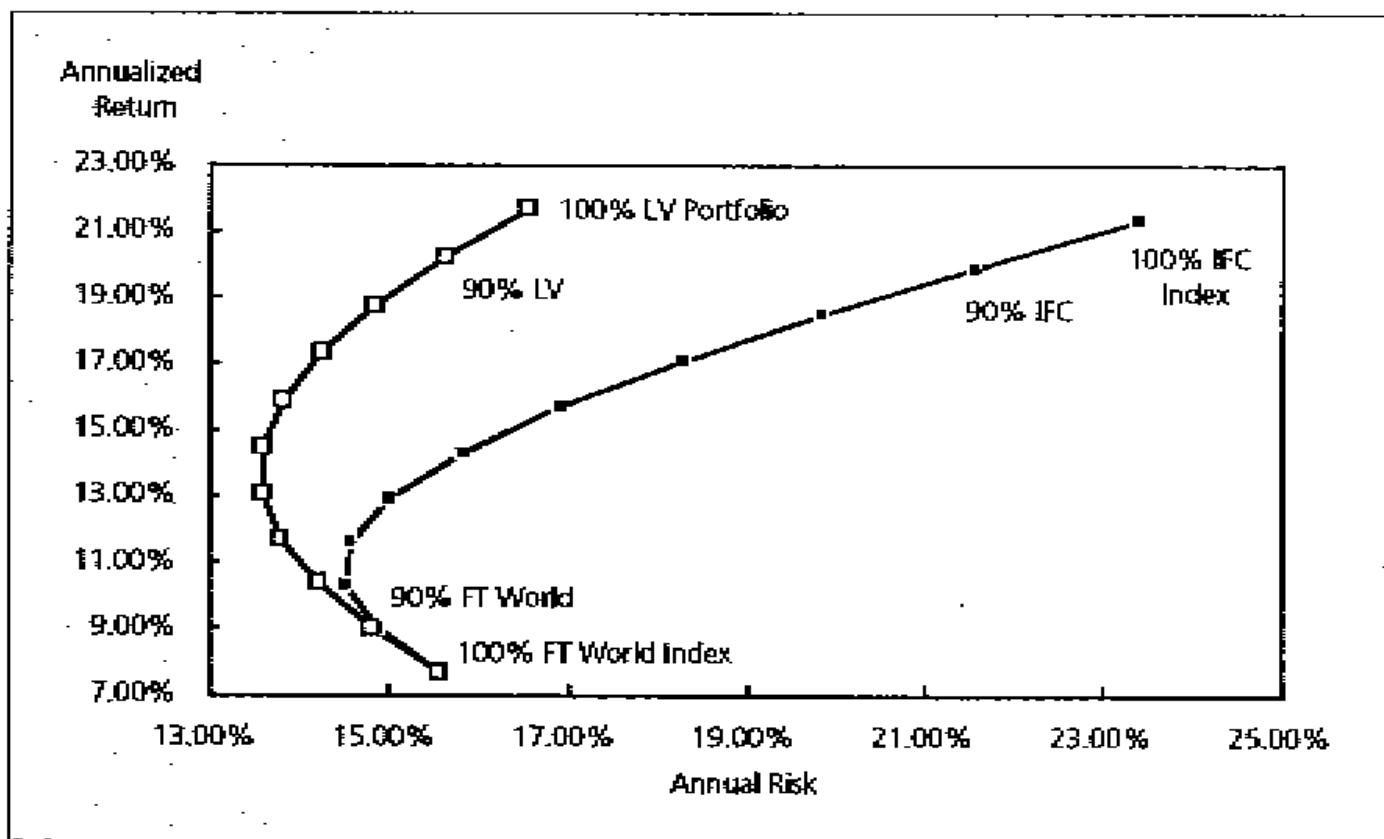


Exhibit 4 shows the impact of adding the LV portfolio to a global portfolio. The choice of capitalization weights or LV weights doesn't seem to make much difference up to weights of 10% in the emerging markets, but the impact is quite dramatic after that. The strategy clearly leads to much greater risk reduction than the capitalization-weighted IFC Index.

Additionally, whereas the lowest volatility of the IFC-FT mix is at approximately a 20% level of investment in emerging markets, the lowest risk point of the LV-FT mix is with an investment of between 40-50% in the emerging markets. Thus, using this methodology strengthens an already strong case for investments in the emerging markets.

But wait, there's more...

Still further risk reduction is possible. The current optimization computed country weights for the LV portfolio based on minimizing risk within the emerging markets, and I then used the LV portfolio as a single asset when combined with the world portfolio. Even further risk reductions would have resulted if the optimization to pick country weights had taken into account the investor's existing mix of countries and asset classes.

The early bird gets the worm

This significant risk reduction occurs primarily because emerging markets are uncorrelated to each other and to developed markets. These correlations will undoubtedly rise as economic and trade links increase among the emerging countries and the developed countries. As this happens, the "diversification free lunch" currently being served will diminish. Indulge while the opportunity exists!

To conclude: modest investments in an emerging markets index fund would reduce the overall portfolio risk of a global investor; larger investments in a LV emerging market portfolio would lead to further risk reduction.

Footnotes

¹ Divecha, Drach and Stefek, 1992, Emerging Markets: A Quantitative Perspective, Journal of Portfolio Management, Fall 1992, p. 41-56

² Haugen, R.A. "Building a better index", Pensions and Investment Age, October 1, 1990, p 56.

³ Vangelisti, Marco "High Return--Low Risk: A Dream Come True?", Barra Newsletter, #139, November/December 1991, p. 1; and "Minimum-Variance Strategies: Do They Work?", Barra Newsletter, #140, January/February 1992, pl.