FAJ Financial Analysts Journal
Volume 67 • Number 3

International Diversification Works (Eventually)

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Critics of international diversification observe that it does not protect investors against short-term market crashes because markets become more correlated during downturns. Although true, this observation misses the big picture. Over longer horizons, underlying economic growth matters more than short-lived panics with respect to returns, and international diversification does an excellent job of protecting investors.

Portfolio diversification is one of the most fundamental and important tenets of modern finance. In the context of global investing and under some very basic assumptions, diversification implies that a portfolio of global equity markets should produce a risk-adjusted return superior to that of any one country held in isolation. Yet, eschewing what is often called the only free lunch in finance, most investors continue to hold portfolios that are either fully or heavily weighted toward domestic securities: the famous home bias.[1]

Global diversification has been the subject of much debate over the years. Given the recent market downturn, an especially relevant criticism of global diversification suggests that because global market correlations tend to go up during crises, diversification is weakest when investors need it most.[2] Although most of these critiques generally concern conditional correlations, a more relevant and perhaps more distressing observation is simply that markets tend to crash at the same time.[3]

We do not dispute these critiques, only their relevance. We concur that markets exhibit coskewness, or a tendency to crash together, to a disturbing degree and that this tendency impairs the ability of a globally diversified portfolio to protect investors from short, systemic crashes. We also contend, however, that those who dismiss diversification on the basis of this argument miss the bigger point. Investors whose planning horizon is measured in decades should not be overanxious about the risk of common, short-term crashes. Instead, they should care more about long, drawn-out bear markets, which can be significantly more damaging to their wealth. Toward that end, we examined the benefits of diversification over long-term holding periods.

What drives the difference between the short- and long-term benefits of diversification? One hypothesis is that short-term market downturns are, at least partly, about panics and broad-based selling frenzies. Long-term results, however, tend to be more about economic performance. We explored this hypothesis by decomposing returns into (1) a component arising from multiple expansion (or contraction) and (2) a component arising from economic performance.[4] By investigating the dynamics of these return contributors, we attempted to offer additional insight into why global diversification can disappoint over the short term but be the free (and hearty!) lunch that theory and common sense say it should be over the long term.[5]

Data

We analyzed diversification benefits from the perspectives of local investors in the following 22 countries for January 1950–December 2008: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. In our analysis, we used monthly local-currency-denominated total returns, exchange rates, and inflation data from multiple sources.

We used local-currency-denominated MSCI country index total returns (available from January 1988 for Finland, Greece, Ireland, and Portugal and from January 1970 for the remaining countries) and backfilled the sample as much as possible with returns provided by Global Financial Data (GFD; available from January 1950 for Australia, Canada, France, Germany, Italy, Japan, Spain, Sweden, the

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United Kingdom, and the United States; from January 1951 for Belgium and the Netherlands; from January 1962 for Finland).[6] We obtained spot exchange rates for Canada and Ireland from Statistics Canada's CANSIM database. We obtained spot exchange rates for France, Germany, Japan, and the United Kingdom for December 1949–December 1969 from GFD; the remaining exchange rate data are from Thomson Reuters Datastream.

Finally, we obtained consumer price index (CPI) data for each country from both GFD and Datastream. For Japan, we used CPI data from GFD for December 1949–December 1969 and from Datastream for January 1970–December 2008. For Germany and the United Kingdom, we used CPI data from GFD for December 1949–February 1961 and from Datastream for March 1961–December 2008. For France, we used CPI data from GFD for December 1949–December 2008. We obtained all the CPI data for the remaining countries from Datastream.

The Diversification Debacle: Markets Crash Together

To examine the benefits of diversification, we considered two candidate portfolios for an investor in each home country:

- *Local portfolio*. This portfolio represents the portfolio held by a home-biased investor. We used the local stock market index as our proxy for this portfolio. In our analysis, the returns to this portfolio are expressed in real terms, adjusted for local inflation.
- *Global portfolio*. This portfolio represents the portfolio held by an investor who chooses to diversify globally. We used an equal-weighted portfolio of all stock market indices as our proxy for this portfolio and did not hedge foreign currency exposure. The returns to this portfolio are expressed in real terms, adjusted for the home country's inflation. Note that the real returns to this global portfolio are not the same from each country's perspective owing to differences in currency returns and inflation. Therefore, we examined 22 separate global portfolios, one from each of the 22 countries' perspectives.[7]

Let us start with a question for the global investor: To what extent did global diversification protect you against your worst local market crashes? To answer this question, **Table 1** presents the performance of the local and global portfolios during the worst, 1st percentile, and 5th percentile months for each of the 22 local portfolios in our sample. For the 1st and 5th percentile returns, we report the conditional value at risk (CVaR), which is the average performance during months with returns below their percentile value.[8] For the United States, the worst month was October 1987, when the local return was down 21.4 percent. During that same month, had a U.S. investor held a global portfolio, it would have been down 21.0 percent. Across all the countries, the average worst monthly local return was –27.0 percent, whereas the global portfolios produced average monthly returns of –17.2 percent in the worst periods.[9] Looking at 1 percent and 5 percent CVaRs for local markets, we see similar results. But although the global portfolios did better than their local counterparts, they were all still down.[10]

These results are consistent with the well-documented observation that correlations across countries rise during bear markets.[11] Although much of the research in this area has focused on conditional variation in correlations, we examined the notion that markets simply tend to crash at the same time. Simultaneous crashes can pose a problem for global diversification by creating more severe tail events in global portfolios than in local portfolios.

To further examine the benefits of diversification, we report the worst, 1st percentile, and 5th percentile local and global monthly CVaRs for each of the 22 countries regardless of when the returns occurred (**Table 2**).[12] In addition, we report the standardized size of each return (the return divided by the full-sample standard deviation of the particular country's returns) and the full-sample skewness of each monthly return series.[13]

As in Table 1, the worst monthly local return for the United States was –21.4 percent (October 1987). In comparison, the worst monthly return for a U.S. investor who held a global portfolio was –24.2 percent (October 2008). The worst month for the U.S. local portfolio was a –5.1 standard deviation event, whereas the worst month for the global portfolio held by a U.S. investor was a –6.2 standard deviation event. That the global portfolio had a bigger statistical event than the local portfolio is consistent with the hypothesis that global portfolios have worse tail events because markets tend to crash together. This phenomenon is also borne out in the measure of skewness. For instance, the U.S. local portfolio had a skewness of –0.6, whereas the global portfolio held by a U.S. investor had a skewness of –1.5. These results are also robust to the 1st and 5th percentile CVaRs: We see a similar pattern of the U.S. investor's global portfolio having larger left-tail events than the U.S. local portfolio.

Looking across all countries, we see that these results are not limited to the United States. The average worst monthly return across the local portfolios was –27.0 percent (an average –4.6

Table 1. Performance of Local and Global Portfolios in the Worst Months for Local Portfolios, January 1950–December 2008

Country	No. of Months in Sample	Worst Local Return			Local Return CVaR (1%)		Local Return CVaR (5%)	
		Month	Local	Global	Local	Global	Local	Global
Australia	708	10/1987	–42.3%	–17.9%	–19.0%	–6.3%	–11.6%	–4.7%
Austria	456	10/2008	–30.2	–16.8	–23.8	–14.0	–14.0	–7.9
Belgium	696	10/2008	–29.6	–16.7	–20.3	–13.0	–11.1	–7.8
Canada	707	10/1987	–21.8	–20.8	–16.4	–11.6	–10.3	–5.6
Denmark	456	10/2008	–17.7	–16.9	–15.3	–15.1	–11.3	–9.0
Finland	564	2/2001	–31.4	–6.7	–23.0	–7.8	–14.8	–5.5
France	708	10/1987	–22.0	–24.3	–16.2	–12.3	–11.3	–6.9
Germany	696	9/2002	–24.9	–12.8	–18.3	–13.9	–11.6	–7.4
Greece	252	10/2008	–29.9	–16.9	–24.1	–12.5	–18.0	–9.7
Hong Kong	413	10/1987	–43.8	–21.3	–29.6	–8.6	–19.2	–6.6
Ireland	252	9/2008	–22.7	–13.5	–20.0	–9.6	–15.2	–9.8
Italy	623	6/1981	–18.8	2.3	–16.2	–10.5	–12.7	–6.9
Japan	708	1/1958	–26.0	–1.4	–18.2	–6.6	–12.5	–6.0
Netherlands	584	10/1987	–22.4	–25.6	–17.6	–15.1	–11.9	–8.8
Norway	456	10/1987	–29.8	–22.9	–25.6	–13.9	–16.9	–7.6
Portugal	252	9/2002	–19.9	–12.8	–18.4	–13.8	–13.8	–8.9
Singapore	456	10/1987	–41.8	–21.5	–27.4	–10.5	–18.6	–8.1
Spain	588	10/1987	–25.7	–25.9	–19.4	–11.7	–12.2	–7.1
Sweden	587	9/1990	–22.4	–12.9	–19.1	–13.2	–13.2	–7.7
Switzerland	456	10/1987	–23.6	–26.5	–16.6	–15.2	–11.6	–10.1
United Kingdom	708	10/1987	–26.3	–25.6	–16.2	–9.6	–11.1	–7.3
United States	708	10/1987	–21.4	–21.0	–13.4	–15.3	–9.1	–7.2
Average	547		–27.0	–17.2	–19.7	–11.8	–13.3	–7.6

Notes: This table reports the magnitude of the worst local total real returns and the concurrent performance of the equal-weighted globally diversified portfolios for each of the 22 countries we analyzed. The second column reports the number of monthly return observations available for each country. The next set of columns reports the month and magnitude of the single worst monthly local returns, as well as the respective concurrent global portfolio returns. The remaining columns report the 1 percent and 5 percent CVaRs, which are the average monthly returns in the 1st and 5th percentiles. Foreign investments are not hedged against currency movements.

standard deviation event), whereas the average worst monthly return across the global portfolios was –23.3 percent (an average –5.4 standard deviation event).[14] Moreover, on average, local portfolios had a skewness of –0.6 whereas global portfolios had a skewness of –1.0.[15]

Ironically, because markets tend to exhibit co-skewness (i.e., crash at the same time), diversification's success in reducing average volatility makes the global portfolio more negatively skewed than the local portfolio. This effect has practical consequences. Because diversification reduces volatility, then to the extent that investors rely on reduced volatility to determine their asset allocation (i.e., if they think they might reduce their equity volatility through diversification, they might increase their allocation to equities relative to other asset classes, such as bonds), in a crash they would likely do worse with the global portfolio than with the local portfolio.

The Importance of Long-Horizon Returns

Now let us step back and think about the larger picture. Short, sharp crashes are certainly painful, but ultimately, investors should care about long-term wealth creation and preservation. So, let us look at the previous analysis of worst cases but do so in the context of long-horizon returns.

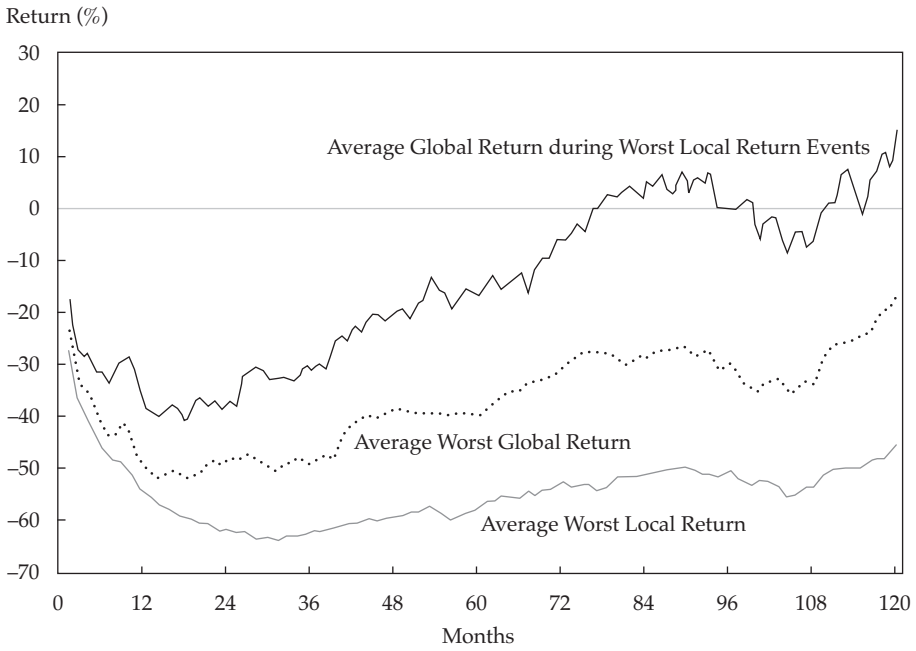
We converted Tables 1 and 2 into **Figure 1**, **Figure 2**, and **Figure 3**, but instead of considering only the worst months, we looked at the worst *periods* of increasing length. In Figure 1, the point on the *x*-axis representing one month corresponds to the average worst monthly returns reported in the two tables. At one month, Figure 1 shows the average worst return for the local portfolios (–27.0 percent), the average global portfolio performance in the same month (–17.2 percent), and the average worst return for the

Table 2. Comparison of Local and Global Portfolio Performance by Worst Month, January 1950–December 2008

	Worst Real Return				Real Return CVaR (1%)				Real Return CVaR (5%)				Monthly Skew	
Country	Local Return	Local σ Event	Global Return	Global σ Event	Local Return	Local σ Event	Global Return	Global σ Event	Local Return	Local σ Event	Global Return	Global σ Event	Local	Global
Australia	–42.3%	–8.4	–17.9%	–4.8	–19.0%	–3.8	–12.8%	–3.4	–11.6%	–2.3	–8.1%	–2.2	–2.0	–0.4
Austria	–30.2	–5.2	–25.3	–5.6	–23.8	–4.1	–16.9	–3.7	–14.0	–2.4	–11.0	–2.4	–0.9	–1.2
Belgium	–29.6	–6.4	–21.0	–5.4	–20.3	–4.4	–15.3	–3.9	–11.1	–2.4	–9.6	–2.5	–1.2	–1.2
Canada	–21.8	–4.8	–20.8	–5.7	–16.4	–3.6	–13.9	–3.8	–10.3	–2.3	–8.4	–2.3	–0.8	–1.0
Denmark	–17.7	–3.3	–25.4	–5.5	–15.3	–2.9	–17.1	–3.7	–11.3	–2.1	–11.3	–2.5	–0.4	–1.2
Finland	–31.4	–4.6	–23.4	–5.4	–23.0	–3.3	–15.9	–3.7	–14.8	–2.2	–10.2	–2.4	–0.3	–0.8
France	–22.0	–4.1	–24.3	–6.1	–16.2	–3.0	–15.0	–3.8	–11.3	–2.1	–9.3	–2.3	–0.4	–1.0
Germany	–24.9	–4.7	–25.8	–5.9	–18.3	–3.5	–15.0	–3.4	–11.6	–2.2	–9.5	–2.2	–0.7	0.2
Greece	–29.9	–2.9	–16.9	–3.3	–24.1	–2.4	–15.9	–3.2	–18.0	–1.8	–12.1	–2.4	0.6	–0.8
Hong Kong	–43.8	–5.0	–25.4	–5.4	–29.6	–3.4	–18.2	–3.9	–19.2	–2.2	–11.4	–2.4	–0.9	–1.4
Ireland	–22.7	–3.7	–16.7	–3.5	–20.0	–3.2	–15.2	–3.2	–15.2	–2.5	–11.8	–2.5	–0.8	–1.0
Italy	–18.8	–2.9	–24.3	–5.8	–16.2	–2.5	–15.5	–3.7	–12.7	–2.0	–10.3	–2.5	0.1	–1.1
Japan	–26.0	–4.5	–30.4	–7.1	–18.2	–3.1	–18.5	–4.3	–12.5	–2.1	–10.2	–2.4	–0.4	–1.8
Netherlands	–22.4	–4.4	–25.6	–6.1	–17.6	–3.5	–16.5	–3.9	–11.9	–2.3	–10.1	–2.4	–0.7	–1.2
Norway	–29.8	–4.0	–22.9	–5.2	–25.6	–3.4	–15.6	–3.5	–16.9	–2.3	–10.7	–2.4	–0.8	–1.0
Portugal	–19.9	–3.2	–16.8	–3.5	–18.4	–3.0	–15.4	–3.2	–13.8	–2.2	–12.0	–2.5	–0.2	–0.9
Singapore	–41.8	–5.2	–22.9	–5.3	–27.4	–3.4	–17.3	–4.0	–18.6	–2.3	–11.0	–2.5	–0.7	–1.4
Spain	–25.7	–4.6	–25.9	–6.1	–19.4	–3.5	–16.5	–3.8	–12.2	–2.2	–10.1	–2.4	–0.5	–1.0
Sweden	–22.4	–3.7	–23.7	–5.9	–19.1	–3.1	–15.1	–3.8	–13.2	–2.2	–9.4	–2.4	–0.3	–0.9
Switzerland	–23.6	–4.8	–26.5	–5.3	–16.6	–3.4	–19.3	–3.8	–11.6	–2.4	–12.6	–2.5	–0.8	–1.3
United Kingdom	–26.3	–5.1	–25.6	–6.5	–16.2	–3.1	–16.0	–4.1	–11.1	–2.2	–9.3	–2.4	–0.1	–1.3
United States	–21.4	–5.1	–24.2	–6.2	–13.4	–3.2	–16.3	–4.2	–9.1	–2.2	–9.6	–2.4	–0.6	–1.5
Average	–27.0	–4.6	–23.3	–5.4	–19.7	–3.3	–16.0	–3.7	–13.3	–2.2	–10.4	–2.4	–0.6	–1.0

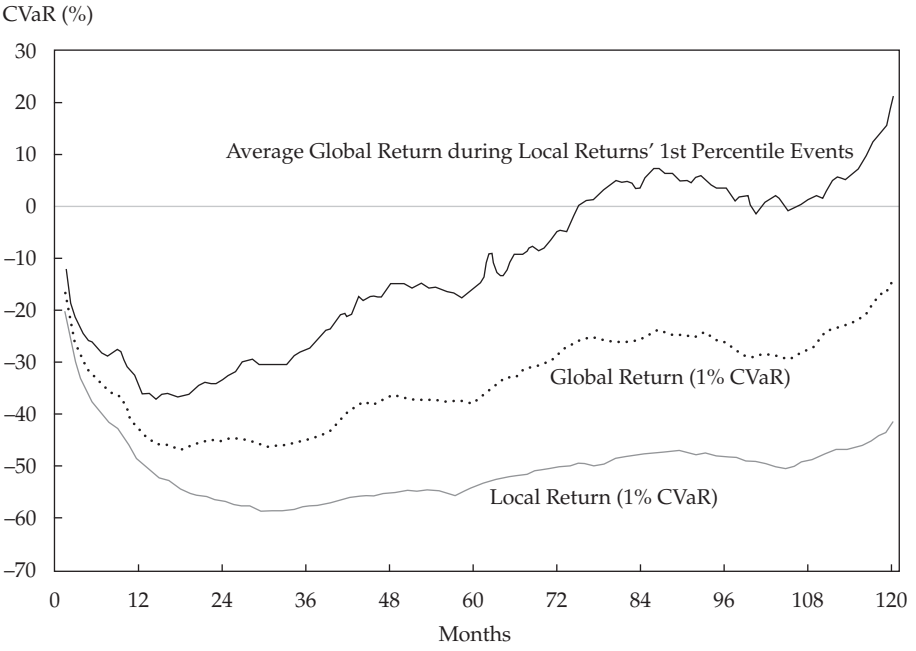
Notes: This table reports the worst monthly total real returns for the local and equal-weighted global portfolios for each of the 22 countries we analyzed, as well as the 1 percent and 5 percent CVaRs, which are the average monthly returns in the 1st and 5th percentiles. The size of these events (related to the full-sample monthly volatility) and the empirical skewness of the respective return series are also reported. Foreign investments are not hedged against currency movements.

Figure 1. Average Worst Returns over Various Holding Periods for Local and Global Portfolios, January 1950–December 2008



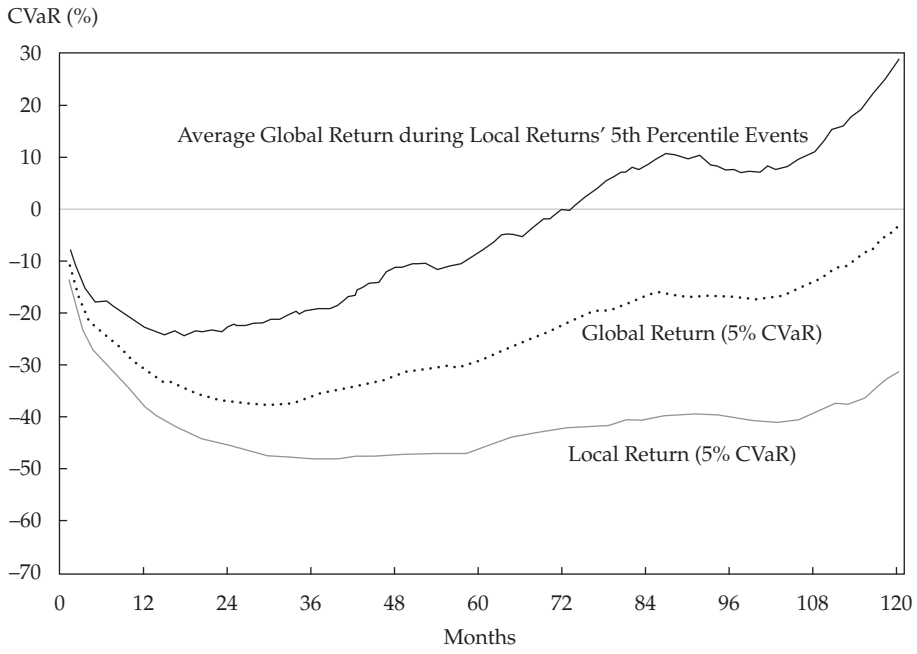
Notes: This figure plots, across the dimension of return horizon, the cross-sectional average worst local returns, the cross-sectional average global returns during the concurrent period of the worst local returns, and the cross-sectional average worst global returns across 22 countries. Foreign investments within the global portfolios are not hedged against currency movements.

Figure 2. Average 1 Percent CVaRs over Various Holding Periods for Local and Global Portfolios, January 1950–December 2008



Notes: This figure plots, across the dimension of return horizon, the cross-sectional average 1 percent CVaRs, the cross-sectional average global returns during the concurrent period of the worst local returns, and the cross-sectional average 1 percent CVaR worst global returns across 22 countries. Foreign investments within the global portfolios are not hedged against currency movements.

Figure 3. Average 5 Percent CVaRs over Various Holding Periods for Local and Global Portfolios, January 1950–December 2008



Notes: This figure plots, across the dimension of return horizon, the cross-sectional average 5 percent CVaRs, the cross-sectional average global returns during the concurrent period of the worst local returns, and the cross-sectional average 5 percent CVaR worst global returns across 22 countries. Foreign investments within the global portfolios are not hedged against currency movements.

global portfolios (–23.3 percent).[16] We then repeated the analysis by looking at longer holding periods, going from 1 month to 120 months. Figures 2 and 3 repeat the same exercise, but instead of plotting the worst returns, Figure 2 plots the 1st percentile CVaR and Figure 3 plots the 5th percentile CVaR.

First, all three figures show that long-horizon local market worst cases can be significantly worse than one-month crashes. Again, as a starting point, we can fairly say that investors should be more concerned about protecting against long-term poor performance than short, sharp crashes. Second, we can see that during the periods of local crisis, the global portfolio was an attractive alternative, particularly over longer horizons. Finally, observe what happens to the gap between the average worst return for the global portfolios and the average worst return for the local portfolios. Over a one-month holding period, there is very little difference: The global portfolios' worst cases were on a par with those of the local portfolios. Over longer horizons, however, the gap widens considerably: The global portfolios' worst cases were significantly better than those of the local portfolios. In other words, all three figures show that even over short horizons (e.g., one month), diversification does offer some protection, although the differences among the three lines are small relative to the size of the event. As the horizons become longer, however, the diversification benefit begins to improve.

For clarity, let us look at a specific example. In Figure 1, at 60 months, the average worst five-year return for the local portfolios was –57 percent (note that these five-year losses did not necessarily occur at the same time). So, if you believe history is any guide to the future and invest in a single country for long enough, you should expect to experience a five-year period in which your real wealth is down 57 percent. While these local portfolios had their worst five-year losses, their global portfolio counterparts lost an average of 16 percent and the average worst five-year return for the global portfolios was –39 percent. Thus, if you hold a global portfolio instead of a local portfolio—again, assuming history as a guide to the future—you should expect to see a worst five-year return of –39 percent. Clearly, if you assume that all countries have the same expected returns, these results suggest that by diversifying globally, you can maintain the same expected return as that of a local portfolio but substantially reduce potential worst-case events.[17]

Let us now look at our finding that global portfolios are more negatively skewed than local

portfolios. **Figure 4** plots the average skewness for both the local portfolios and the global portfolios for various holding period returns. **Figure 5** plots the average skewness of the global portfolios minus that of the local portfolios for the same holding period returns. For each country, we estimated the full-sample skewness of overlapping rolling returns for each holding period and then computed the cross-sectional average of the individual skewness estimates. Both figures also show the 95 percent bootstrapped confidence intervals for the skews.[18] In Figure 4, at the point on the *x*-axis representing one month, the average skewness of the monthly returns to the local portfolios is –0.7 and the average skewness of the monthly returns to the global portfolios is worse, –1.2. For both, we can reject the hypothesis that the estimate is zero because zero is not enveloped by the confidence intervals at one month. As we look at longer holding periods, however, we see that the average negative skewness of both local and global portfolios goes away.

Similarly, Figure 5 shows, with strong statistical confidence, that globally diversified portfolios are more negatively skewed than their local counterparts at short horizons. As we look at longer horizons, however, this difference goes away. When holding periods reach 3.5 years, we begin to fail to reject the hypothesis that their skews are the same (and the absolute differences get very small). Finally, as we pass five years, even the point estimates no longer differ.

The Capitalization-Weighted Portfolio

The previous analysis focused on equal-weighted global portfolios rather than the more commonly used cap-weighted global portfolios. We used equal-weighted portfolios, in part, because of the lack of availability of long-term data on market capitalization. But because equal-weighted portfolios are not the typical choice for investors seeking to diversify globally, we examined our results by using cap-weighted portfolios.[19] Before looking at the results, let us discuss the pros and cons of the two versions of the global portfolio.

The Pros and Cons of Equal Weights. The primary advantage of the equal-weighted portfolio is that it is the more broadly diversified of the two approaches. Although not as readily available as the cap-weighted portfolio, it is both relevant and implementable for the individual investor. The equal-weighted portfolio, however, is impractical for many large institutions to use collectively.[20]

The Pros and Cons of Capitalization Weights. An important advantage of the cap-weighted portfolio is that it is more implementable than the equal-weighted portfolio. Most of the many options for global investing are cap weighted. Furthermore, it has the theoretically appealing property of being the only kind of portfolio that investors can hold in aggregate.[21] It does, however, have two major disadvantages. The first is that the cap-weighted portfolio is not particularly diversified. On average, the United States constitutes 50 percent of the weight; Japan, 18 percent; the United Kingdom, 9 percent. The remaining 19 countries share 23 percent of the portfolio weight. Arnott, Hsu, and Moore (2005) and Asness (2006) discussed the second disadvantage of the cap-weighted portfolio—namely, that it suffers from an unintended tilt against value.[22] As a result, any positive expected return to value leads to an expected return drag on cap-weighted portfolios that can be meaningful over long horizons, the focus of our study.

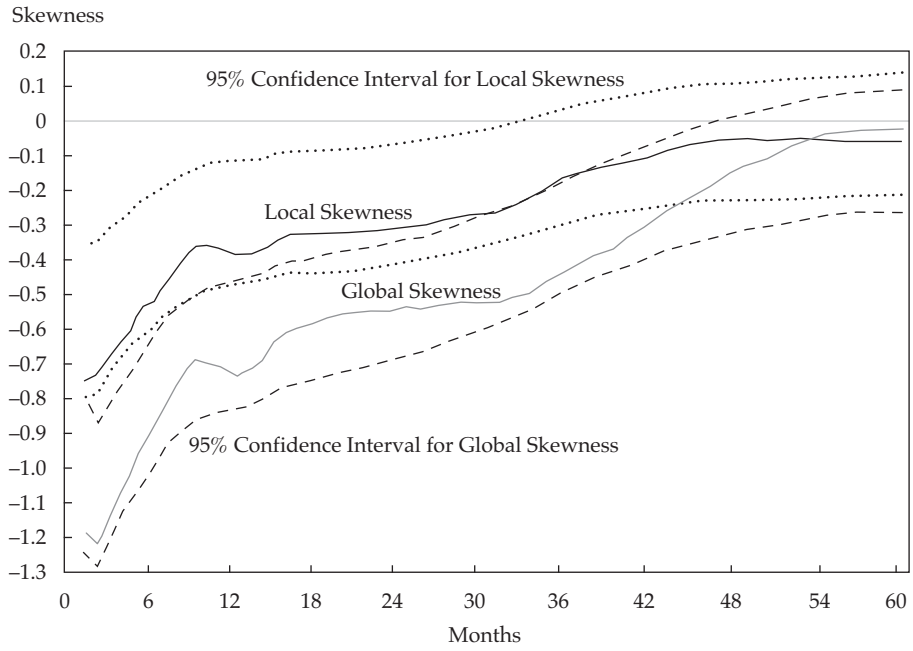
In general, these considerations broadly suggest a trade-off between performance and implementability. From a performance perspective, we would expect better results from the equal-weighted portfolio, because it is the most diversified, and worse results from the cap-weighted portfolio, because of its poor diversification and implicit tilt against value.

Figure 6 revisits the question, To what extent did global diversification protect you against your worst local market crashes? in terms of the two weighting approaches. For holding periods ranging from 1 month to 120 months, it plots the differences between (1) the average returns for the global portfolios during the worst return periods for the local portfolios and (2) the average worst returns for the local portfolios (see Figure 1). Note that for the equal-weighted portfolio, this is simply the difference between (1) and (2) recomputed over the shortened sample period.

Clearly, the average performance of the global portfolios during the worst periods for the local portfolios improves over longer holding periods, and this result holds for both methods of forming global portfolios. Not surprisingly, the improvement is greater for the equal-weighted portfolios. We verified that the results presented in Figure 6 are robust to the 1st and 5th percentile CVaRs instead of worst-case returns.

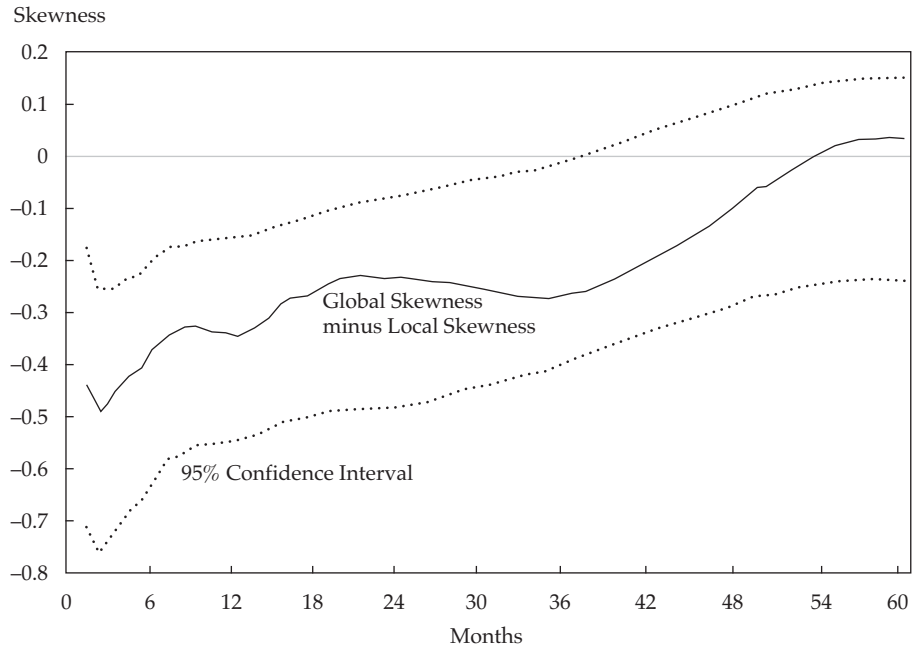
For the two weighting approaches, **Figure 7** plots the differences between the average worst-case events for the global portfolios and those for the local portfolios. For the equal-weighted portfolio, this is simply the difference between the average worst returns for the global portfolios and the

Figure 4. Average Local and Global Portfolio Skewness over Various Holding Periods, January 1950–December 2008



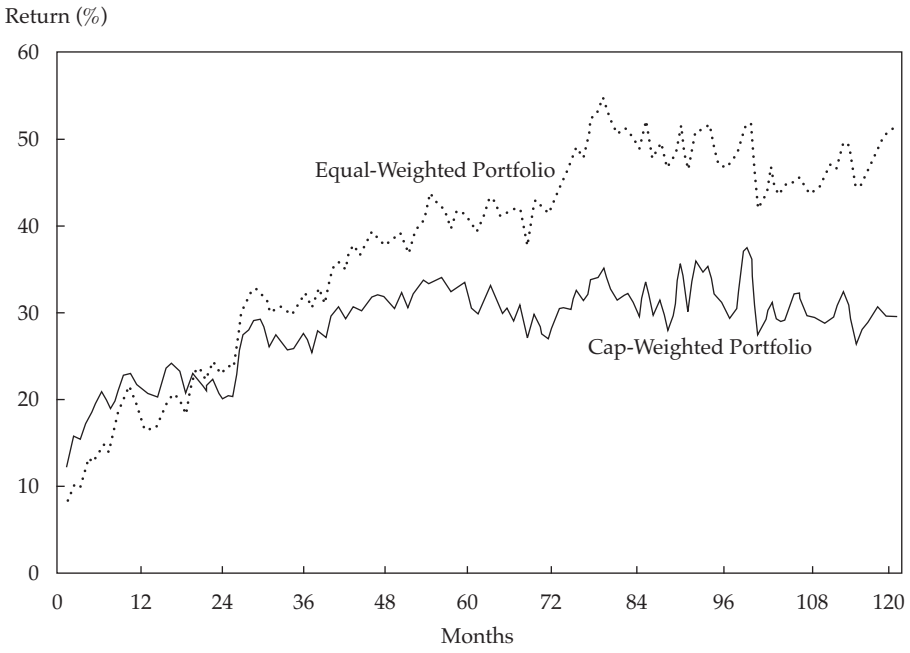
Notes: This figure plots the cross-sectional average skewness of local and equal-weighted global total real continuously compounded returns across 22 countries for holding periods of 1–60 months. Following Politis and Romano (1992), we used the *circular bootstrap* for dependent data to perform 50,000 bootstraps with a 49-month block size as determined by the *automatic block-length selection algorithm* for dependent data (see Politis and White 2004). The confidence intervals are the 2.5 and 97.5 percentiles of the 50,000 bootstrapped estimates.

Figure 5. Average Global Skewness minus Average Local Skewness over Various Holding Periods, January 1950–December 2008



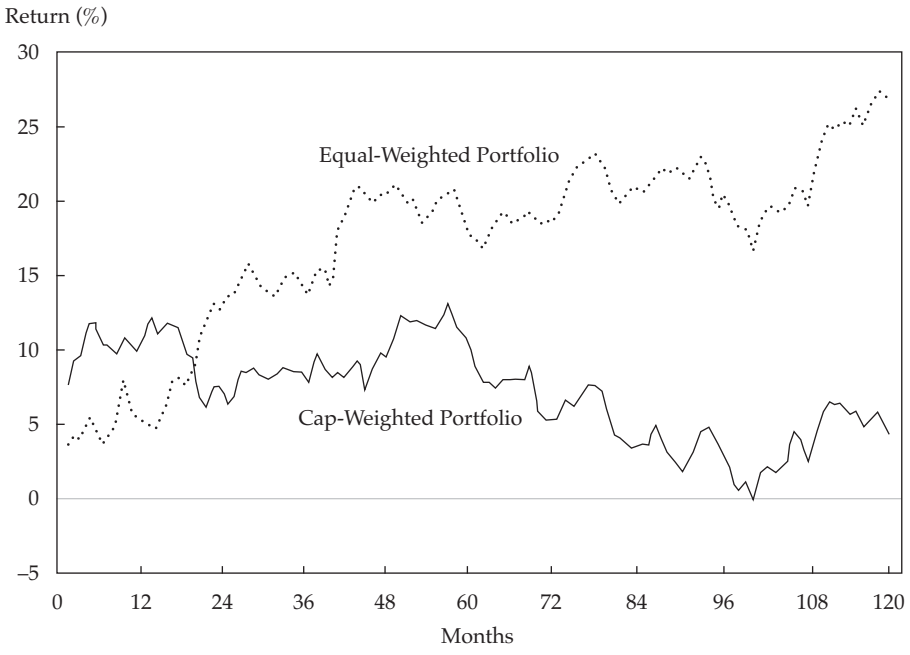
Notes: See notes to Figure 4. This figure plots the cross-sectional average skewness of equal-weighted global portfolios minus the average skewness of local portfolios across 22 countries for holding periods of 1–60 months, where the returns are total, real, and continuously compounded.

Figure 6. Average Global minus Local Returns during Worst Local Return Periods over Various Holding Periods, January 1970–December 2008



Notes: This figure plots, across the dimension of return horizon, the cross-sectional average differences in global and local returns during the periods of worst local returns across 22 countries. Foreign investments within the global portfolios are not hedged against currency movements.

Figure 7. Average Worst Global Returns minus Average Worst Local Returns, January 1970–December 2008



Notes: This figure plots, across the dimension of return horizon, the cross-sectional average differences in worst global and worst local returns across 22 countries. Foreign investments within the global portfolios are not hedged against currency movements.

average worst returns for the local portfolios (see Figure 1). As before, compared with the average worst cases for the local portfolios, those for the equal-weighted portfolios improve over longer holding periods. The results for the cap-weighted portfolios, however, are less impressive. Cap-weighted portfolios show little to no improvement as we extend the holding period. This result is consistent with the arguments that cap-weighted portfolios are less diversified than equal-weighted portfolios and suffer from a negative value tilt that hurts long-term returns.[23]

In sum, we see that investors who diversify through equal-weighted portfolio allocations are rewarded with significantly improved worst-case events. Moderating diversification and betting against value by investing in cap-weighted portfolios, however, reduce those benefits.

Although not as readily available as cap-weighted portfolios, equal-weighted portfolios are implementable for all but perhaps the largest institutional investors. For those unwilling to use the equal-weighted approach, our findings suggest that a fundamental-indexation approach (e.g., weighting by GDP or book value) would be preferable to a cap-weighted approach for constructing global portfolios.

The Strength of Diversification in the Long Run

Our analysis suggests that the benefits of diversification in down markets depend on the investment horizon. Over the short run, pain is fairly well distributed across markets and diversification is at its weakest. Over longer periods, however, there are meaningful differences in realized returns. Why might this be the case?

One hypothesis is that short-term returns are influenced more by short-term changes in risk aversion (crashes could result from a global spike in risk aversion as people panic at the same time), whereas long-term returns are driven more by realized economic performance. Moreover, unlike short-term crashes, which tend to affect all countries together, long-term economic performance tends to be more variable across countries.

To examine this hypothesis empirically, we decomposed country stock market returns across two dimensions (see Appendix A for the math and a description of the estimation methodology): (1) the returns attributable to multiple expansion versus the returns attributable to economic performance and (2) the returns attributable to common global performance versus the returns attributable to country-specific performance. By combining these two components, we obtained a four-term decomposition of a country's total return:

1. Country-specific multiple expansion
2. Country-specific economic performance
3. Global multiple expansion
4. Global economic performance

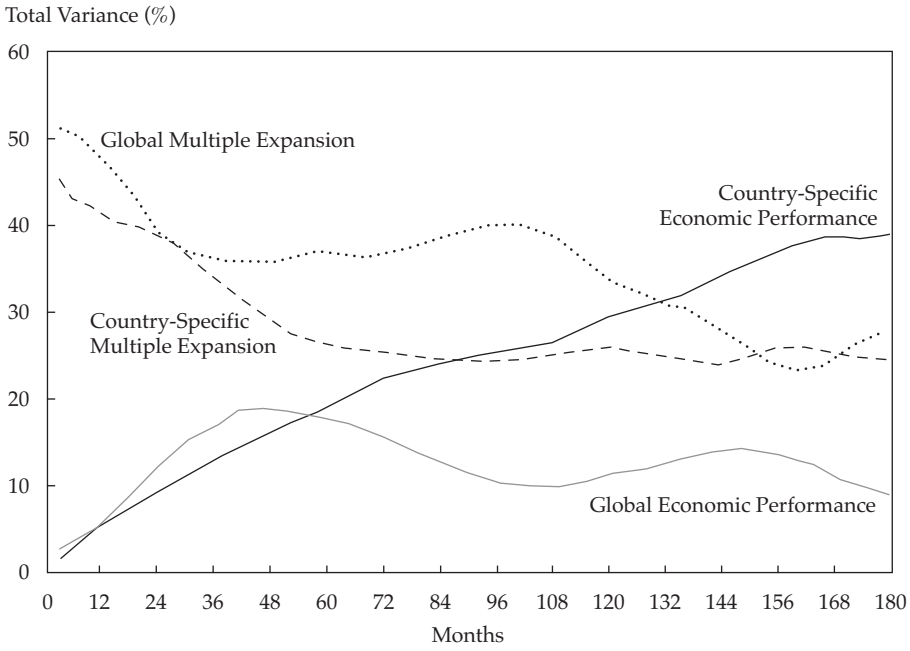
If global multiple expansion explains substantial variability in short-term stock returns, then "people panicking at the same time" can have an important impact on short-term country returns because the sharp increase in risk aversion should lead to sharp multiple contraction across the board. Our hypothesis is that although global multiple expansion may be important over the short term, country-specific economic performance and global economic performance should be more important over the long term. Moreover, to the extent that country-specific economic performance dominates global economic performance, global diversification should be more beneficial over the long term.[24]

Figure 8 presents the decomposition of country return variance for holding periods ranging from one quarter (3 months) to 15 years (180 months). This decomposition shows that over the short term, returns are primarily driven by multiple expansion. Country-specific multiple expansion and global multiple expansion combined explain an overwhelming 96 percent of quarterly returns, whereas country-specific economic performance and global performance explain only 4 percent. Moreover, the common global multiple expansion component of returns is the largest contributor to risk, accounting for 51 percent of the variation in quarterly returns. Therefore, if investors panic globally at the same time, causing global multiples to contract, markets will, not surprisingly, crash together.[25]

Over longer holding periods, however, multiple expansion becomes a less important component of returns and economic performance becomes a more important component. Moreover, global economic performance is not the component that explains most of the long-term stock market returns. Country-specific economic performance dominates long-term performance, explaining about 1 percent of quarterly returns and 39 percent of 15-year returns and rising quite linearly over time. Our findings strongly support the hypothesis that long-term returns are primarily about a country's economic performance and long-term economic performance varies across countries.

Let us use Japan as an example (noting that our results are not limited to Japan). Japan's lost decade (the 1990s) did not happen because of a panic or globally coordinated rise in risk aversion; it happened because of a decade-long idiosyncratic

Figure 8. Variance Decomposition of Local Returns over Various Holding Periods, January 1970–December 2008



Notes: This figure plots a variance decomposition of 22 countries' local returns into four components: (1) country-specific multiple expansion, (2) country-specific economic performance, (3) global multiple expansion, and (4) global economic performance. See Appendix A for the details of the decomposition methodology. The *x*-axis represents the return horizon in months, and the *y*-axis represents the percentage of total variance contributed by each component.

economic disaster. Our findings suggest that although this event might have been extreme for Japan, that at least one country would experience such an event is normal. Not knowing which countries will suffer from protracted economic underperformance is precisely what international diversification protects investors against.

Conclusion

Over the short term, global diversification can disappoint. Markets tend to crash at the same time; thus, global diversification lets investors down exactly when they need it most. Not surprisingly, critics have argued that international diversification offers little protection vis-à-vis purely domestic portfolios.

We argued that this critique misses the point. Common, short-term crashes can be painful, but long-term returns are far more important to wealth creation and destruction. We showed that over the long term, markets do not tend to crash at the same time. This finding is no surprise because even though market panics can be important drivers of short-term returns, country-specific economic performance dominates over the long term. Diversification protects investors against the adverse effects of holding concentrated positions in countries with poor long-term economic performance. Let us not fail to appreciate the benefits of this protection.

We thank Michael Katz and Lasse Pedersen for helpful comments and suggestions. *The information set forth herein has been obtained or derived from sources believed by the authors to be reliable. However, the authors do not make any representation or warranty, express or implied, as to the information's accuracy or completeness, nor do the authors recommend that the attached information serve as the basis of any investment decision. This article has been provided to you solely for information purposes and does not constitute an offer or solicitation of an offer, or any advice or recommendation, to purchase any securities or other financial instruments, and may not be construed as such.*

This article qualifies for 1 CE credit.

Appendix A. Measuring Multiple Expansion vs. Economic Performance

Let us start with the one-period return for country *i*:

$$1+R^i_{t-1,t}=\frac{P^i_t+D^i_t}{P^i_{t-1}}=\frac{P^i_t\left(1+D^i_t/P^i_t\right)}{P^i_{t-1}}=\frac{P^i_t/D^i_t\left(1+D^i_t/P^i_t\right)}{P^i_{t-1}/D^i_{t-1}}\frac{D^i_t}{D^i_{t-1}}. \quad \text{(A1)}$$

Let p^i_t and d^i_t denote log prices and dividends, respectively, for country *i*; $v^i_t \equiv p^i_t - d^i_t$ denotes the log valuation multiple, and $r^i_{t-k,t}$ represents the *k*-period logged total return for country *i*, where dividends are reinvested monthly. Further, the log dividend yield is defined as $y^i_t=\log\left(1+D^i_t/P^i_t\right)$, where D^i_t represents the dividends paid on country *i* from period *t* – 1 to *t* and P^i_t represents the price of country *i*'s stock market at time *t*. Then, taking logs of Equation A1 and summing the logged returns over *k* periods, we get

$$r^i_{t-k,t}=\left(v^i_t-v^i_{t-k}\right)+\left(d^i_t-d^i_{t-k}\right)+y^i_{t-k,t}, \quad \text{(A2)}$$

where

$$y^i_{t-k,t}=\sum_{j=0}^{k-1}y^i_{t-j}$$

Thus, we decompose a *k*-period return into two pieces:

1. $\left(v^i_t-v^i_{t-k}\right)$, the component of the return over *k* periods arising from a change in the valuation multiple. This part of the return should reflect changes in investors' risk aversion. If people panic and risk aversion spikes, multiples should contract. Unfortunately, this component is not a clean measure of risk aversion because changes in expected future growth can also move multiples. Because of the difficulties involved, we do not attempt to further decompose multiple expansion/contraction arising from changes in discount rates or changes in expected cash flows.
2. $\left(d^i_t-d^i_{t-k}\right)$, the return over *k* periods arising from dividend growth, plus $y^i_{t-k,t}$, the total accumulated dividends paid during the *k* periods. This component reflects economic performance. Note that economic performance is all about realizations. Even if valuation multiples remain fixed, an increase in dividends is associated with higher prices and thus a positive return. Accumulated dividend yield is the actual cash flow received over the holding period.

Measuring Common Global Performance vs. Country-Specific Performance. To examine this measure, we also decompose returns into a common and an idiosyncratic component:

$$r^i_{t-k,t}=\bar{r}_{t-k,t}+\left(r^i_{t-k,t}-\bar{r}_{t-k,t}\right). \quad \text{(A3)}$$

This simple decomposition provides (1) $\bar{r}_{t-k,t}$, the average return across all countries, which we call the global component of returns, and (2) $\left(r^i_{t-k,t}-\bar{r}_{t-k,t}\right)$, a country's return in excess of the global return, which we call the country-specific component of returns. Combining the two decompositions (Equations A2 and A3) leads to

$$\begin{aligned} r^i_{t-k,t}=\ & \\ & \left(\bar{v}_t-\bar{v}_{t-k}\right) && \text{(global multiple expansion)}\\ & +\left(\bar{d}_t-\bar{d}_{t-k}\right)+\bar{y}_{t-k,t} && \text{(global economic performance)}\\ & +\left(v^i_t-\bar{v}_t\right)-\left(v^i_{t-k}-\bar{v}_{t-k}\right) && \text{(country-specific multiple expansion)}\\ & +\left(d^i_t-\bar{d}_t\right)-\left(d^i_{t-k}-\bar{d}_{t-k}\right)+\left(y^i_{t-k,t}-\bar{y}_{t-k,t}\right). && \text{(country-specific economic performance)} \end{aligned}$$

Variance Decomposition. For each country in our study, we first computed the time series of these four components by using market prices (the same ones we used earlier) and dividend yields from Morgan Stanley Capital International. Owing to the availability of yield data, our return decomposition analysis was for the sample period 1970–2008.[26] To compute the variance decomposition, we used the following methodology:

$$\begin{aligned} \mathrm{var}\left(r^i_{t-k,t}\right)&=\mathrm{cov}\left(r^i_{t-k,t},r^i_{t-k,t}\right)\\ &=\mathrm{cov}\left[r^i_{t-k,t},\left(\bar{v}_t-\bar{v}_{t-k}\right)\right]\\ &+\mathrm{cov}\left[r^i_{t-k,t},\left(\bar{d}_t-\bar{d}_{t-k}\right)+\bar{y}_{t-k,t}\right]\\ &+\mathrm{cov}\left[r^i_{t-k,t},\left(v^i_t-\bar{v}_t\right)-\left(v^i_{t-k}-\bar{v}_{t-k}\right)\right]\\ &+\mathrm{cov}\left[\begin{matrix}r^i_{t-k,t},\left(d^i_t-\bar{d}_t\right)-\left(d^i_{t-k}-\bar{d}_{t-k}\right)\\ +\left(y^i_{t-k,t}-\bar{y}_{t-k,t}\right)\end{matrix}\right]. \end{aligned}$$

For each holding period of 3–180 months, we pooled our panel of countries and returns to compute each of the four covariance terms. Figure 8 shows the percentage contribution of each of the four terms to the overall variance.

Notes

1. For a sampling of research on home bias, see French and Poterba (1991); Tesar and Werner (1995); Baxter and Jermann (1997); Coval and Moskowitz (1999); Lewis (1999); Strong and Xu (2003); Karlsson and Nordén (2007); Sercu and Vanpee (2007); Graham, Harvey, and Huang (2009).
2. See Odier and Solnik (1993); Erb, Harvey, and Viskanta (1994, 1995); Longin and Solnik (1995, 2001); Karolyi and Stulz (1996); de Santis and Gerard (1997); Bekaert, Erb, Harvey, and Viskanta (1998); Ang and Bekaert (2002); Ang and Chen (2002); Chua, Kritzman, and Page (2009); Leibowitz and Bova (2009).
3. Hartmann, Straetmans, and de Vries (2004) found evidence of asset market linkages during crises. Their finding is related to, yet distinct from, the observation that markets tend to crash at the same time, because high correlations during bear markets are not the same as bear markets occurring at the same time. Christoffersen, Errunza, Jacobs, and Jin (2010) found significant tail dependence (increasing over time) in weekly returns across developed markets. Interestingly, they reported very low tail dependence among emerging markets, which suggests that the "diversification fails when you need it most" critique may be less applicable to those who extend their portfolios' breadth to include an exposure to developing markets.
4. Note that although we focused on short-run multiple changes arising from changes in risk aversion, we cannot rule out the hypothesis that these changes occur because of changes in expectations about future economic growth.
5. Ironically, many proponents of equity investing espouse its long-term benefits, whereas those who attack the power of global diversification focus solely on its performance over days or months and ignore its long-term success.
6. Across our broad country cross section, the reliability of the return data may be lower before the introduction of MSCI indices, in 1970. After we ran our analysis on the subsample beginning in 1970, however, our conclusions were unchanged.
7. Because equities are significantly more volatile than currencies and inflation, however, the 22 global portfolio returns are highly correlated. Across all pairwise combinations, the average full-sample monthly correlation of global portfolios is 0.83, versus 0.44 for local portfolios.
8. When considering returns for holding periods greater than one month, we estimated percentiles and CVaRs by using monthly overlapping rolling returns.
9. Note that these returns are not perfectly comparable across countries because local market returns and global returns are denominated in different currencies in different countries.
10. That the global portfolios outperformed the local portfolios is not altogether surprising given that (1) the global portfolios had lower volatility and (2) we started by choosing the worst period for the local portfolios and only then looked at the global portfolios' performance in the same period; the local portfolios were thus naturally inclined to look worse than the global portfolios.
11. See Erb et al. (1994, 1995); Longin and Solnik (1995, 2001); Karolyi and Stulz (1996); de Santis and Gerard (1997); Bekaert et al. (1998); Ang and Bekaert (2002); Ang and Chen (2002).
12. In choosing between a local portfolio and a global portfolio, investors must do more than simply examine how the global portfolio performs when the local portfolio suffers (as in Table 1); they must also ascertain how poorly the global portfolio performs regardless of what happens to the local portfolio.
13. Note that for each country, we considered global returns only in periods when local returns were available. For instance, we truncated Greece's global portfolio to begin January 1988 in order to align it with its local portfolio return availability. If we had not done so, the global portfolio might have exhibited a significantly worse worst case compared with the local portfolio, which would be an artifact of our not having data for the local portfolio during such periods as the 1987 crash.
14. Note that although the average worst monthly return for the global portfolios was still better than that for the local portfolios—because the volatility of the global portfolios was substantially less than that of the local portfolios—the standard deviation event for the global portfolios was worse than that for the local portfolios.
15. As in Table 1, the results presented in Table 2 are robust to the exclusion of individual countries. At the monthly (annual) horizon, only 3 (4) of the 22 countries had local standard deviation events larger than their global standard deviation events, and the local portfolios of 3 (5) of the 22 countries had a more negative skewness than their global portfolios.
16. Again, note that the worst months for the global portfolios do not necessarily coincide with the worst months for the local portfolios.
17. The quintessential example of this phenomenon is Japan in the 1990s. Over that decade, Japan's equity market lost 40 percent in real terms and its global portfolio appreciated 131 percent. In fact, a potential critique of our results is that they are driven by Japan's underperformance in the 1990s. We believe that the conclusions from our analysis are relevant because Japan's performance in the 1990s was a real event and there is little reason to believe that it cannot be repeated from another country's perspective. We repeated the same exercise 22 times, excluding a different country from the sample each time, and found that our results are not driven by any one country.
18. Following Politis and Romano (1992), we used the *circular bootstrap* for dependent data to perform 50,000 bootstraps with a 49-month block size as determined by the *automatic block-length selection algorithm* for dependent data (see Politis and White 2004). We selected the 49-month block size by looking at the dependence in both 2nd and 1st moments. We used the 2.5 and 97.5 percentiles of the 50,000 bootstraps to construct the 95 percent confidence bands.

19. Limited by data availability, we truncated our sample for the analysis of cap-weighted portfolios. To ensure that the comparisons between the two weighting approaches were not due to sample differences, we removed observations from the equal-weighted portfolio analysis if market-cap information was unavailable. Data on Denmark, Norway, Austria, Singapore, and Sweden were available beginning December 1970; Hong Kong, beginning July 1974; Finland, January 1982; Ireland, January 1996; Portugal, July 1998; and Greece, July 2001. Data on the remaining countries were available beginning January 1970.
20. In fact, DeMiguel, Garlappi, and Uppal (2007) presented evidence across many datasets that a simple equal-weighted approach to forming portfolios consistently produces higher out-of-sample Sharpe ratio portfolios than more sophisticated approaches based on mean–variance optimization.
21. Siegel (2003) vigorously defended cap-weighted benchmarks on the grounds of their simplicity and mean–variance efficiency. He also acknowledged Jobson and Korkie (1981), who showed that the equal-weighted portfolio is at least as efficient as the cap-weighted portfolio under certain conditions.
22. Some readers might recall that Asness (2006) was openly critical of the work on fundamental indexation. In fact, those critiques were not about the approach but, rather, about the claim that fundamental indexation is anything beyond a simple value tilt away from a cap-weighted benchmark.
23. The results plotted in Figure 7 are robust to the 1st and 5th percentile CVaRs instead of worst-case returns.
24. One could extend our discussion to the topic of "decoupling," which is much in vogue these days. One way to view our results is that over the short term, decoupling cannot exist in a year like 2008; over the long term, however, decoupling is entirely possible, if unlikely. Of course, our results do not tell us in which direction decoupling might occur in the future.
25. Note that 51 percent is an average number over all periods. Although we were unable to do a variance decomposition for crashes alone, we suspect that the contribution of the global multiple change in these periods is far higher than 51 percent.
26. For most countries in our sample, data on dividend yields were available beginning January 1970. The data on dividend yields for Finland were available beginning January 1988; Greece, January 1992; Hong Kong, January 1973; Ireland, May 1990; and Portugal, January 1990.

References

Ang, Andrew, and Geert Bekaert. 2002. "International Asset Allocation with Regime Shifts." *Review of Financial Studies*, vol. 15, no. 4 (July):1137–1187.

Ang, Andrew, and Joseph Chen. 2002. "Asymmetric Correlations of Equity Portfolios." *Journal of Financial Economics*, vol. 63, no. 3 (March):443–494.

Arnott, Robert D., Jason Hsu, and Philip Moore. 2005. "Fundamental Indexation." *Financial Analysts Journal*, vol. 61, no. 2 (March/April):83–99.

Asness, Cliff. 2006. "The Value of Fundamental Indexing." *Institutional Investor*, vol. 19, no. 1 (October):67–71.

Baxter, Marianne, and Urban J. Jermann. 1997. "The International Diversification Puzzle Is Worse Than You Think." *American Economic Review*, vol. 87, no. 1 (March):170–180.

Bekaert, Geert, Claude B. Erb, Campbell R. Harvey, and Tadas E. Viskanta. 1998. "Distributional Characteristics of Emerging Market Returns and Asset Allocation." *Journal of Portfolio Management*, vol. 24, no. 2 (Winter):102–116.

Christoffersen, Peter, Vihang Errunza, Kris Jacobs, and Xisong Jin. 2010. "Is the Potential for International Diversification Disappearing?" Working paper (June).

Chua, David B., Mark Kritzman, and Sébastien Page. 2009. "The Myth of Diversification." *Journal of Portfolio Management*, vol. 36, no. 1 (Fall):26–35.

Coval, Joshua D., and Tobias J. Moskowitz. 1999. "Home Bias at Home: Local Equity Preference in Domestic Portfolios." *Journal of Finance*, vol. 54, no. 6 (December):2045–2073.

DeMiguel, Victor, Lorenzo Garlappi, and Raman Uppal. 2007. "Optimal versus Naive Diversification: How Inefficient Is the 1/*N* Portfolio Strategy?" *Review of Financial Studies*, vol. 22, no. 5 (December):1915–1953.

de Santis, Giorgio, and Bruno Gerard. 1997. "International Asset Pricing and Portfolio Diversification with Time-Varying Risk." *Journal of Finance*, vol. 52, no. 5 (December):1881–1912.

Erb, Claude B., Campbell R. Harvey, and Tadas E. Viskanta. 1994. "Forecasting International Equity Correlations." *Financial Analysts Journal*, vol. 50, no. 6 (November/December):32–45.

———. 1995. "Country Risk and Global Equity Selection." *Journal of Portfolio Management*, vol. 21, no. 2 (Winter):74–83.

French, Kenneth R., and James M. Poterba. 1991. "Investor Diversification and International Equity Markets." *American Economic Review*, vol. 81, no. 2 (May):222–226.

Graham, John R., Campbell R. Harvey, and Hai Huang. 2009. "Investor Competence, Trading Frequency, and Home Bias." *Management Science*, vol. 55, no. 7 (July):1094–1106.

Hartmann, Philipp, Stefan Straetmans, and Casper de Vries. 2004. "Asset Market Linkages in Crisis Periods." *Review of Economics and Statistics*, vol. 86, no. 1 (March):313–326.

Jobson, J.D., and Bob Korkie. 1981. "Putting Markowitz Theory to Work." *Journal of Portfolio Management*, vol. 7, no. 4 (Summer):70–74.

Karlsson, Anders, and Lars Nordén. 2007. "Home Sweet Home: Home Bias and International Diversification among Individual Investors." *Journal of Banking & Finance*, vol. 31, no. 2 (February):317–333.

Karolyi, G. Andrew, and René M. Stulz. 1996. "Why Do Markets Move Together? An Investigation of U.S.–Japan Stock Return Comovements." *Journal of Finance*, vol. 51, no. 3 (July):951–986.

Leibowitz, Martin L., and Anthony Bova. 2009. "Diversification Performance and Stress-Betas." *Journal of Portfolio Management*, vol. 35, no. 3 (Spring):41–47.

Lewis, Karen. 1999. "Trying to Explain Home Bias in Equities and Consumption." *Journal of Economic Literature*, vol. 37, no. 2 (June):571–608.

Longin, François, and Bruno Solnik. 1995. "Is the Correlation in International Equity Returns Constant: 1960–1990?" *Journal of International Money and Finance*, vol. 14, no. 1 (February):3–26.

———. 2001. "Extreme Correlation of International Equity Markets." *Journal of Finance*, vol. 56, no. 2 (April):649–676.

Odier, Patrick, and Bruno Solnik. 1993. "Lessons for International Asset Allocation." *Financial Analysts Journal*, vol. 49, no. 2 (March/April):63–77.

Politis, Dimitris N., and Joseph P. Romano. 1992. "A Circular Block-Resampling Procedure for Stationary Data." In *Exploring the Limits of Bootstrap*. Edited by Raoul LePage and Lynne Billard. New York: Wiley.

Politis, Dimitris N., and Halbert White. 2004. "Automatic Block-Length Selection for the Dependent Bootstrap." *Econometric Reviews*, vol. 23, no. 1 (December):53–70.

Sercu, Piet, and Rosanne Vanpee. 2007. "Home Bias in International Equity Portfolios: A Review." Working paper (August).

Siegel, Laurence B. 2003. *Benchmarks and Investment Management*. Charlottesville, VA: Research Foundation of the Association for Investment Management and Research.

Strong, Norman, and Xinzhong Xu. 2003. "Understanding the Equity Home Bias: Evidence from Survey Data." *Review of Economics and Statistics*, vol. 85, no. 2 (May):307–312.

Tesar, Linda L., and Ingrid M. Werner. 1995. "Home Bias and High Turnover." *Journal of International Money and Finance*, vol. 14, no. 4 (August):467–492.

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