Risk-Based Indexing: Growth Optimal World Equity (GrOWE)

QUANTITATIVE STRATEGIES RESEARCH GROUP

DB Advisors
Deutsche Bank Group

Executive Summary

Equity market bubbles create a dangerous pitfall for passive investors in market capitalization-weighted indices. As investor sentiment — rather than fundmentals — begins to push up valuations, companies in the affected sector or region issue more equity, forcing index investors to expand their holdings. The bubble feeds on itself, increasing market concentration. And when the bubble finally bursts, the excessive weighting in that market sector makes the losses all the greater.

The value destruction after the bursting of the late-1990s 'tech' bubble prompted DB Advisors to develop a new approach to passive investing, risk-based indexing. Our strategy, called Growth Optimal World Equity (GrOWE), seeks to avoid these problems through improved diversification, building a portfolio from the ground up without the traditional anchor of a capitalization-weighted benchmark. It looks to create greater diversification by taking into account the primary drivers of equity market returns, sector and region, in a systematic way.

Key benefits include:

- Better absolute risk-adjusted returns: GrOWE offers a higher level of diversification than market cap-weighted indices, which can lead to higher risk-adjusted returns (return/risk) than these indices.
- Less downside risk: GrOWE's greater diversification can lead to smaller losses when equity markets decline.
- Low correlation to other enhanced/active managers: GrOWE's added value comes from superior portfolio construction, not security selection, leading to low correlation of excess return compared to traditional enhanced and active managers.

Exploiting the benefits of diversification has helped our GrOWE strategies consistently achieve absolute risk-adjusted returns above the MSCI World and MSCI EAFE indices. Since its inception in August 2001 to December 2007, the GrOWE World strategy has showed an annualized return of 10.30% with an annualized volatility of 12.09%. For GrOWE EAFE, the annualized return has been 16.61% with an annualized volatility of 13.72%.*

GrOWE has achieved these returns by:

1 | Identifying and efficiently capturing key drivers of equity market returns. We believe the two main drivers of equity returns are a company's business sector and its geographical region.

2 | Creating a more diversified portfolio to increase risk-adjusted returns. We believe that diversification adds value, especially in the absence of strong knowledge of which assets will do better than others.

3 | Rebalancing the portfolio to capture changes in markets. We believe that rebalancing not only maintains a more diverse portfolio but also aids in "selling high" and "buying low."

In this article, we discuss the rationale for developing GrOWE and outline the investment process, examining the strategy's performance, its risks and its active exposures to countries, sectors, and styles. We conclude by explaining the diversification ideas behind GrOWE's positions.

*Past performance is not indicative of future results.

Rationale for GrOWE

Traditional capitalization-weighted indexing can become concentrated and momentum-oriented, creating volatile returns.

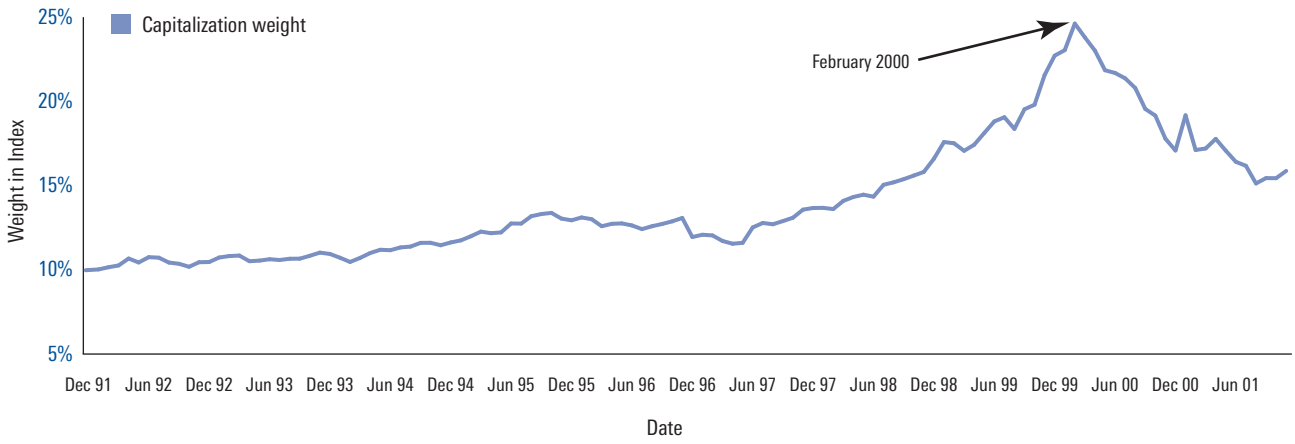
When the technology bubble in the equity market ended with a bang in 2000, it highlighted an important weakness of market capitalization-weighted indices: they can become quite concentrated and subject to momentum. During the late 1990s, the weighting of Technology, Media and Telecommunication—so called TMT—stocks grew substantially in many indices.

This included the MSCI World Equity Index, in which TMTs surged from just over 10% to almost 25% of the total (see Figure 1). The higher weighting caused index funds—and active managers—to bid up these stocks further, thereby giving them a bigger market cap and thus a larger weight in equity indices.

The concentration in these sectors created more risk, eventually leading to negative returns as this higher level of concentration unwound starting in 2000. Although this was a particularly dramatic example, it is far from an isolated one. A more recent instance was the collapse of a bubble in financial services stocks in 2007; many other less extreme examples play out every year over shorter time periods.

In 2000 and 2001, in collaboration with a large client, we set out to develop an investment strategy to address this problem of high levels of concentration within traditional market cap-weighted portfolios.

Figure 1: MSCI World capitalization weight of technology, media and telecommunication stocks (December 31, 1991 to November 30, 2001)



Source: MSCI

Benefits of Diversification

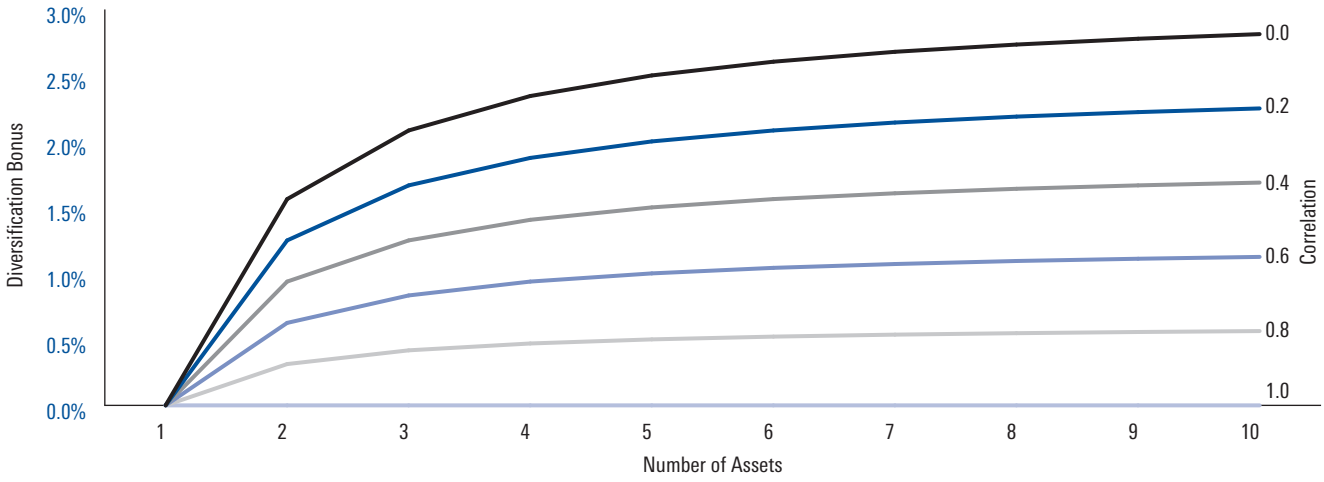
A more diversified investment strategy that takes into account correlations can lead to risk reduction and higher returns.

Many authors[1] have written extensively about the benefits of diversification, of which the most obvious is risk reduction. But a more direct benefit of diversification to portfolio returns is a higher growth rate. Figure 2 shows the difference in the expected growth rates between a portfolio of a single asset and an equally-weighted portfolio, as a function of the number of assets and the correlation between them. It shows that the lower the correlation and the greater the number of assets, the greater the bonus from diversification.

Note that there is no benefit from diversification if the common correlation is 1, because in this extreme case, holding a single asset produces the same returns as holding the equally-weighted portfolio. Similarly, if only one asset is available, there is obviously no benefit from diversification.

The expected growth rate is defined as the long-run average rate of return on the portfolio. Remarkably, the expected growth rate of a portfolio has another interpretation: it is the logarithm of the *median* return.[2] This means that the expected growth rate represents a rate of return that our portfolio will exceed with a probability of 1/2, and will fail to exceed with a probability of 1/2. The expected growth rate gives a realistic view of future returns on our portfolio. (The analysis on which this chart is based is explained in more detail in the technical appendix.)

Figure 2: Diversification bonus as a function of the number of assets and correlation (assuming asset vol as 25%)



Source: DB Advisors Quantitative Strategies Research Group
For illustrative purposes only.

[1]For recent discussion of diversification and rebalancing, see, for example Bernstein and Wilkinson (1997), Booth and Fama (1992), and Campbell and Erb (2005).

[2]This statement is exactly true if returns follow the lognormal distribution, but otherwise it is generally a good approximation.

The GrOWE Investment Process

The GrOWE investment process differs from standard market capitalization indexing primarily in seeking improved diversification.

To increase diversification, we first classify all stocks by the key drivers of return: region and sector. Next, we analyze which region/sector combinations have a high correlation to each other and put them in a single bucket or "cluster." Then we weight the clusters equally to seek a high level of diversification. We then rebalance to capture changes in markets and "buy low" and "sell high."

1 | Risk unit construction

We take the MSCI Developed World universe and partition it into "risk units," which consist of stocks in the same region and sector. A typical risk unit is "Americas Materials" or "Asian Financials." (The complete list may be seen in Figure 3.) This partition allows us to allocate exposure to the 36 risk units that we believe drive return.

2 | Clustering

We next organize these risk units into clusters using statistical analysis. The goal of this process is to gather highly correlated risk units into the same cluster, while keeping correlations between risk units in different clusters as low as possible. Typically, we create six clusters because this number has historically explained a substantial proportion—about 70% to 80%—of the variation in risk-unit returns. The clustering process uses five years of monthly risk unit return data to estimate correlations. Clustering is carried out once per year, in June.

3 | Portfolio construction

Each June, we form a portfolio. First we assign an equal weight to each cluster. Then we equal-weight the risk units within each cluster. Finally, we capitalization-weight the stocks in each risk unit to take into account the liquidity of the stocks. This weighting scheme is referred to as "equal-equal-cap weighting." The currency exposure of this portfolio will be different from the MSCI World Index as country weights will differ. We typically leave this exposure unhedged unless clients have specific currency policies or requests.

4 | Rebalancing

After the June reclustering, the portfolio is rebalanced back to the equal-equal-cap weighting at the end of each quarter until the following June.

Figure 3 shows how risk units were assigned to clusters in GrOWE in June 2006 and June 2007. All risk units in a given cluster are seen to have the same weight, and these weights add to 1/6 = 16.67%. This means that the weight of a risk unit is inversely proportional to the number of risk units in its cluster. The rationale behind this weighting scheme is that a risk unit with few clustermates is a good diversifier and so is assigned a greater weight.

As Figure 3 shows, four risk units changed clusters from 2006 to 2007. Americas Utilities moved from cluster 5 to cluster 2. Three risk units, Americas Media, Americas Diversified Financials and Americas Information Technology, moved from cluster 1 to cluster 4. The breakup of the very large cluster 1 in 2007 may indicate increased diversification in the global equity universe.

Figure 3: The GrOWE portfolio in June 2006 and June 2007

June 2006

Portfolio weight	After June 2006 clustering
	Cluster 1: 16.67%
1.19%	Americas Materials
1.19%	Americas Industrials
1.19%	Americas Consumer Discretionary
1.19%	Americas Media
1.19%	Americas Financials
1.19%	Americas Diversified Financials
1.19%	Americas Information Technology
1.19%	EMU Industrials
1.19%	EMU Consumer Discretionary
1.19%	EMU Financials
1.19%	Non-EMU Industrials
1.19%	Non-EMU Consumer Discretionary
1.19%	Non-EMU Financials
1.19%	Europe + Asia Materials
	Cluster 2: 16.67%
3.33%	EMU Consumer Staples
3.33%	EMU Health Care
3.33%	Non-EMU Consumer Staples
3.33%	Non-EMU Health Care
3.33%	Europe + Asia Utilities
	Cluster 3: 16.67%
3.33%	Asia Industrials
3.33%	Asia Consumer Discretionary
3.33%	Asia Financials
3.33%	Asia Information Technology
3.33%	Asia Consumer Staples + HealthCare + Telecommunication Services
	Cluster 4: 16.67%
2.78%	Americas Pharmaceuticals
2.78%	Americas Internet Software and Services, IT Consulting and Services, Software
2.78%	Americas Telecommunication Services
2.78%	EMU Telecommunication Services
2.78%	Non-EMU Telecommunication Services
2.78%	Europe Information Technology
	Cluster 5: 16.67%
4.17%	Americas Energy
4.17%	Americas Utilities
4.17%	EMU Energy
4.17%	Non-EMU + Asia Energy
	Cluster 6: 16.67%
8.33%	Americas Consumer Staples
8.33%	Americas Health Care

June 2007

Portfolio weight	After June 2007 clustering
	Cluster 1: 16.67%
1.52%	Americas Materials
1.52%	Americas Industrials
1.52%	Americas Consumer Discretionary
1.52%	Americas Financials
1.52%	EMU Industrials
1.52%	EMU Consumer Discretionary
1.52%	EMU Financials
1.52%	Non-EMU Industrials
1.52%	Non-EMU Consumer Discretionary
1.52%	Non-EMU Financials
1.52%	Europe + Asia Materials
	Cluster 2: 16.67%
2.78%	Americas Utilities
2.78%	EMU Consumer Staples
2.78%	EMU Health Care
2.78%	Non-EMU Consumer Staples
2.78%	Non-EMU Health Care
2.78%	Europe + Asia Utilities
	Cluster 3: 16.67%
3.33%	Asia Industrials
3.33%	Asia Consumer Discretionary
3.33%	Asia Financials
3.33%	Asia Information Technology
3.33%	Asia Consumer Staples, HealthCare, Telecommunication Services
	Cluster 4: 16.67%
1.85%	Americas Media
1.85%	Americas Pharmaceuticals
1.85%	Americas Diversified Financials
1.85%	Americas Information Technology
1.85%	Americas Internet Software & Services, IT Consulting and Services, Software
1.85%	Americas Telecommunication Services
1.85%	EMU Telecommunication Services
1.85%	Non-EMU Telecommunication Services
1.85%	Europe Information Technology
	Cluster 5: 16.67%
5.56%	Americas Energy
5.56%	EMU Energy
5.56%	Non-EMU + Asia Energy
	Cluster 6: 16.67%
8.33%	Americas Consumer Staples
8.33%	Americas Health Care

Source: DB Advisors Quantitative Strategies Research Group

For illustrative purposes only. The weightings are based on a representative portfolio, which is included in the composite. A client's account may differ due to specific guidelines and restrictions.

Performance Objective Achieved

In both the live period and backtest, GrOWE has delivered higher absolute and risk-adjusted returns compared to traditional capitalization-weighted indexing.

The GrOWE strategy has performed well in the live period since its inception in August 2001 to the end of 2007, and has met its objective of higher risk-adjusted returns than the MSCI World Equity Index. Figure 4 shows that GrOWE has returned 10.30% (gross of fees) on an annualized basis, with an annualized volatility of 12.1%. This return results in a Sharpe ratio of 0.60, which is almost 50% higher than the Sharpe ratio of the MSCI World Net USD over the live period. Figure 5 compares the cumulative returns of the benchmark and of GrOWE (gross of fees), and the outperformance is apparent there too.

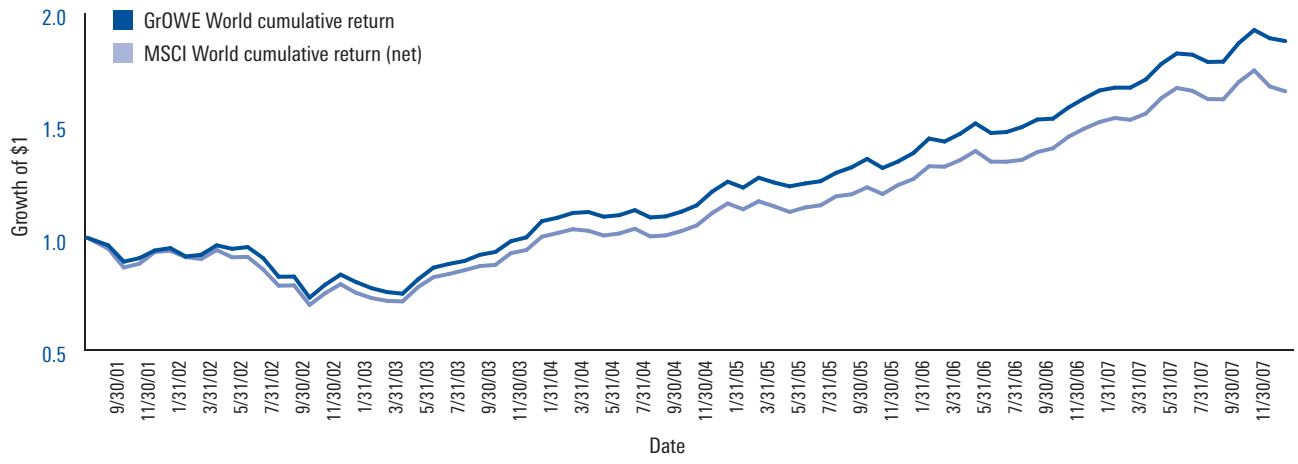
Before GrOWE's inception, the strategy was backtested over a long period. Figure 6 gives the results of that backtest, from March 1985 to July 2001. Again we see good performance, with a 1.7% annualized excess return with active risk of 4.1%. This higher risk compared to the more recent period reflects the low-volatility environment for the equity markets between 2003 and mid-2007. The Sharpe ratio in the backtest period is 0.6, the same as the live period, which shows that historically we would have also produced better risk-adjusted returns.

Figure 4*: GrOWE live performance—August 1, 2001 (inception) to December 31, 2007

Portfolio	Annualized return	Annual volatility	Beta	Active risk	Excess return	Sharpe ratio
GrOWE Composite (Gross of fees)	10.3%	12.1%	95.0%	2.5%	2.1%	0.6
MSCI World Net USD	8.2%	12.6%	100.0%	0.0%	0.0%	0.4

Source: DB Advisors Quantitative Strategies Research Group

Figure 5*: GrOWE and benchmark cumulative returns (growth of $1)—August 1, 2001 (since inception) to December 31, 2007



Source: DB Advisors Quantitative Strategies Research Group

*Past performance is not indicative of future results.

Figure 6†: GrOWE backtest performance—March 1985 to July 2001

Portfolio	Annualized return	Annual volatility	Beta	Active risk	Excess return	Sharpe ratio
GrOWE Backtest	14.8%	14.8%	95.8%	4.1%	1.7%	0.6
MSCI World Gross USD	13.1%	14.9%	100.0%	0.0%	0.0%	0.5

Source: DB Advisors Quantitative Strategies Research Group

†Results represent backtested information based on a model portfolio. No representation is being made that any portfolio will, or is likely to replicate the information shown. A client's account may differ due to specific guidelines and restrictions. Past performance is no guarantee of future results. Both backtest and benchmark returns are considered gross of withholding tax.

GrOWE Performance Patterns

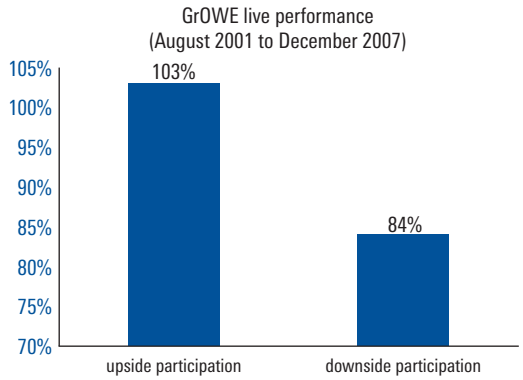
GrOWE's higher level of diversification has led to smaller losses in down markets than more concentrated market cap-weighted indices.

It is clear from examining quarterly performance patterns that GrOWE's returns—live since its launch—declined less during negative months than those of the MSCI World Index. As GrOWE specifically targets a higher level of diversification than traditional capitalization-weighted portfolios, it is not surprising to see this result. In addition, when markets have risen, GrOWE has kept up with MSCI World, as it tends to be more diverse and catch unexpected upside trends. This performance is illustrated in Figure 7.

Figure 8 displays cumulative returns of the benchmark and a backtest of GrOWE. The backtest shows generally good performance—apart from the late '90s bubble years. In this period, as performance and index weights of technology, media and telecommunication stocks surged, GrOWE would have underperformed the market.

This underperformance in a bubble is to be expected. Because GrOWE largely ignores capitalization weights, it tends to rebalance out of appreciating stocks and so will underperform if they continue to appreciate for extended time periods.

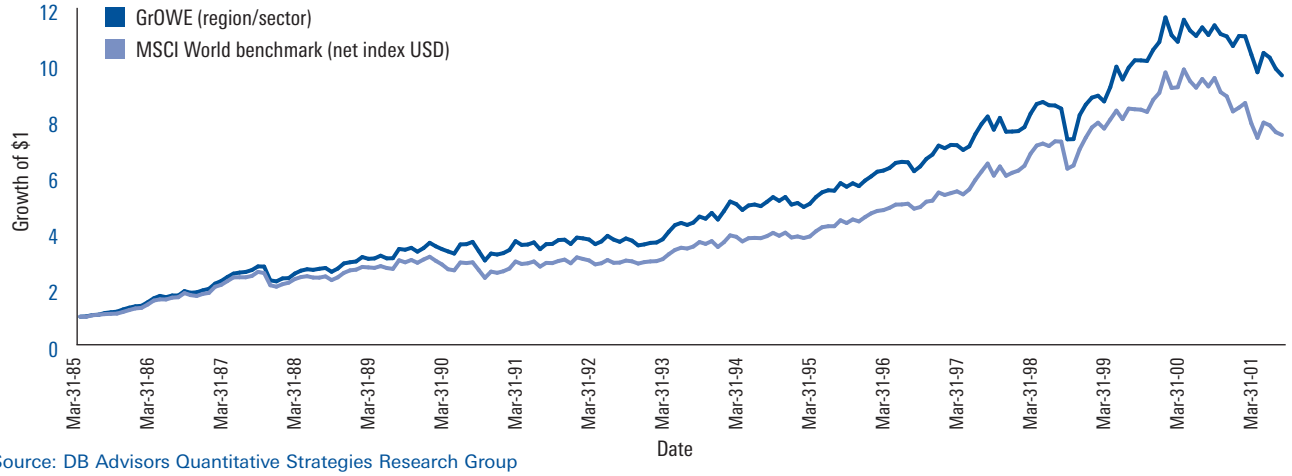
Figure 7*: Upside/downside market participation



Source: DB Advisors Quantitative Strategies Research Group

*Past performance not indicative of future results.

Figure 8†: Backtested GrOWE cumulative returns versus its benchmark from March 1985 to July 2001 (hypothetical)



Source: DB Advisors Quantitative Strategies Research Group

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Figure 9 illustrates this effect by comparing GrOWE weights with market weights for technology, media and telecommunication stocks over the bubble period. This is the same chart as Figure 1 but updated to include data from the GrOWE strategy. GrOWE's weight in these sectors increased only modestly during the bubble, and fell only modestly when the bubble burst. This clearly shows the more diversified nature of the GrOWE strategy when compared to traditional market cap-weighted indices.

GrOWE Risk and Exposures

GrOWE has no persistent active style or size risks versus the MSCI World.

Because of GrOWE's greater diversification and frequent rebalancing, it offers, in general, lower risk than the MSCI World Index. Figure 4 displays total risk for both GrOWE and its benchmark, computed based on monthly returns since inception. True to GrOWE's theme of diversification, its risk is indeed about 50 basis points lower than that of the benchmark. Considering another standard measure of risk, GrOWE's beta is also lower than that of the benchmark. We also observed a reduced beta in the backtest results shown in Figure 6, but GrOWE's total risk was roughly the same as that of the benchmark for that period.

As shown in Figure 4, GrOWE's active risk with respect to the MSCI World Developed index has been 2.5% in the live period. For the backtest period (shown in Figure 6), the active risk was higher, at 4.1%. This is a reflection of the low-volatility environment for equity markets between 2003 and mid 2007. The high level of active risk in the backtest period helps explain why GrOWE's total risk matched that of the benchmark in that period.[3]

This ex-post measurement of 2.5% active risk bears out Barra's ex-ante risk analysis, presented in Figure 10, which forecasts future active risk at 2.87%. Figure 10 also gives a detailed decomposition of GrOWE's active risk, based on a Barra analysis of holdings as of December 2007. This analysis shows that the largest contributors to risk are country and industry, as intended by the process.

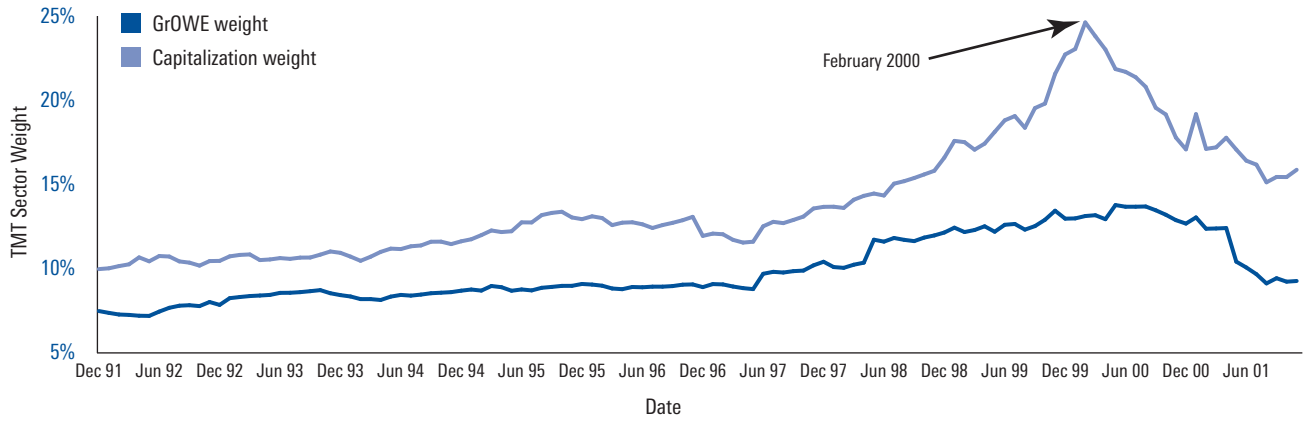
Figure 10: Decomposition of active risk—December 2007

Source	Risk (% std dev)	Contribution (% active risk)
Risk indices	0.63	4.82
Industry risk	1.28	19.83
Country risk	1.89	43.45
Currency risk	0.86	9.05
Stock-specific risk	0.78	7.47
Other	N/A	15.38
Active	2.87	100.00

Source: DB Advisors Quantitative Strategies Research Group

For illustrative purposes only. The weightings are based on a representative portfolio, which is included in the composite. A client's account may differ due to specific guidelines and restrictions.

Figure 9: MSCI World capitalization weight and hypothetical GrOWE World weight of technology, media and telecommunication stocks (December 31, 1991 to November 30, 2001)



Source: DB Advisors Quantitative Strategies Research Group

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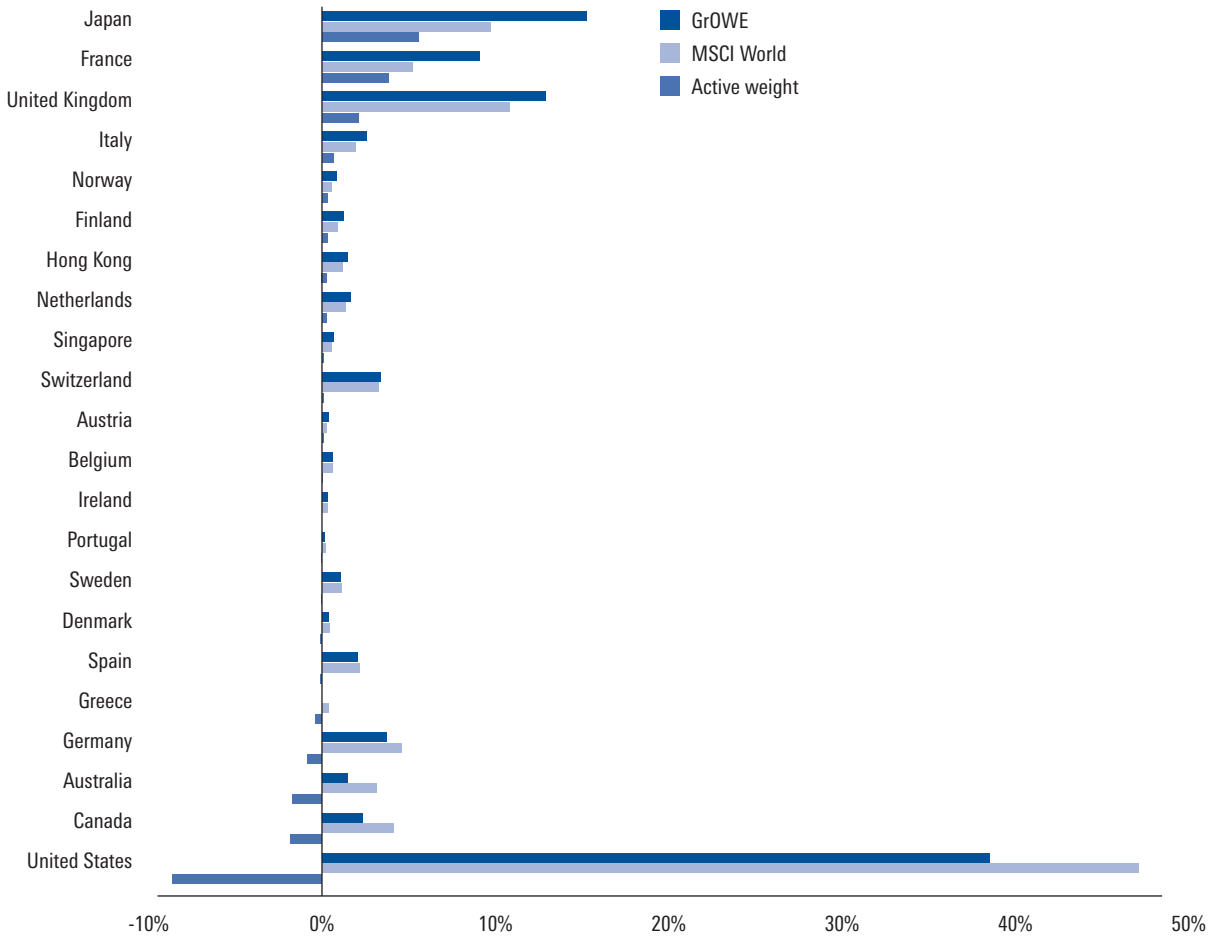
[3]It may also reflect weaknesses in the old MSCI sector definitions, on which risk units were based in the backtest period. For example, gold was one of the eight sectors in the old MSCI industry definitions. This system was replaced by the GICS (Global Industry Classification Standard) industry definitions in 2001, and GrOWE has been based on GICS since inception.

Country and sector exposures

Figure 11 displays the current active country weights of GrOWE against the MSCI World Developed Markets index, in descending order, as of December 2007. The largest active position is an 8.6% underweight in the U.S. This position makes sense from the viewpoint of the GrOWE strategy. The U.S. is a huge integrated market, comprising almost 50% of the index, and it is subject to powerful internal risk factors—the most important of these probably being U.S. investor sentiment. Because of this, assets in the U.S. tend to fall into clusters that have large capitalization weights, which GrOWE therefore underweights. Moreover, U.S. companies make up a large portion of globally integrated industries, such as Industrials and Financials, and again there is a tendency for these companies to fall into large clusters which are underweighted by GrOWE.

The second-largest active position is the 5.6% overweight in Japan. This results from the fact that Asian stocks tend to be highly correlated to each other, but weakly correlated to non-Asian assets, and so tend to cluster by themselves. In fact, from Figure 3 we see that most Asian assets—but no non-Asian assets—fall into cluster 3 in both June 2006 and June 2007. Each cluster has a weight of 1/6 = 16.7%, hence the overweight in Japan, and in other Asian countries. Japan is an attractive diversifier with respect to the rest of the world.

Figure 11: Country weights for December 2007



Source: DB Advisors Quantitative Strategies Research Group

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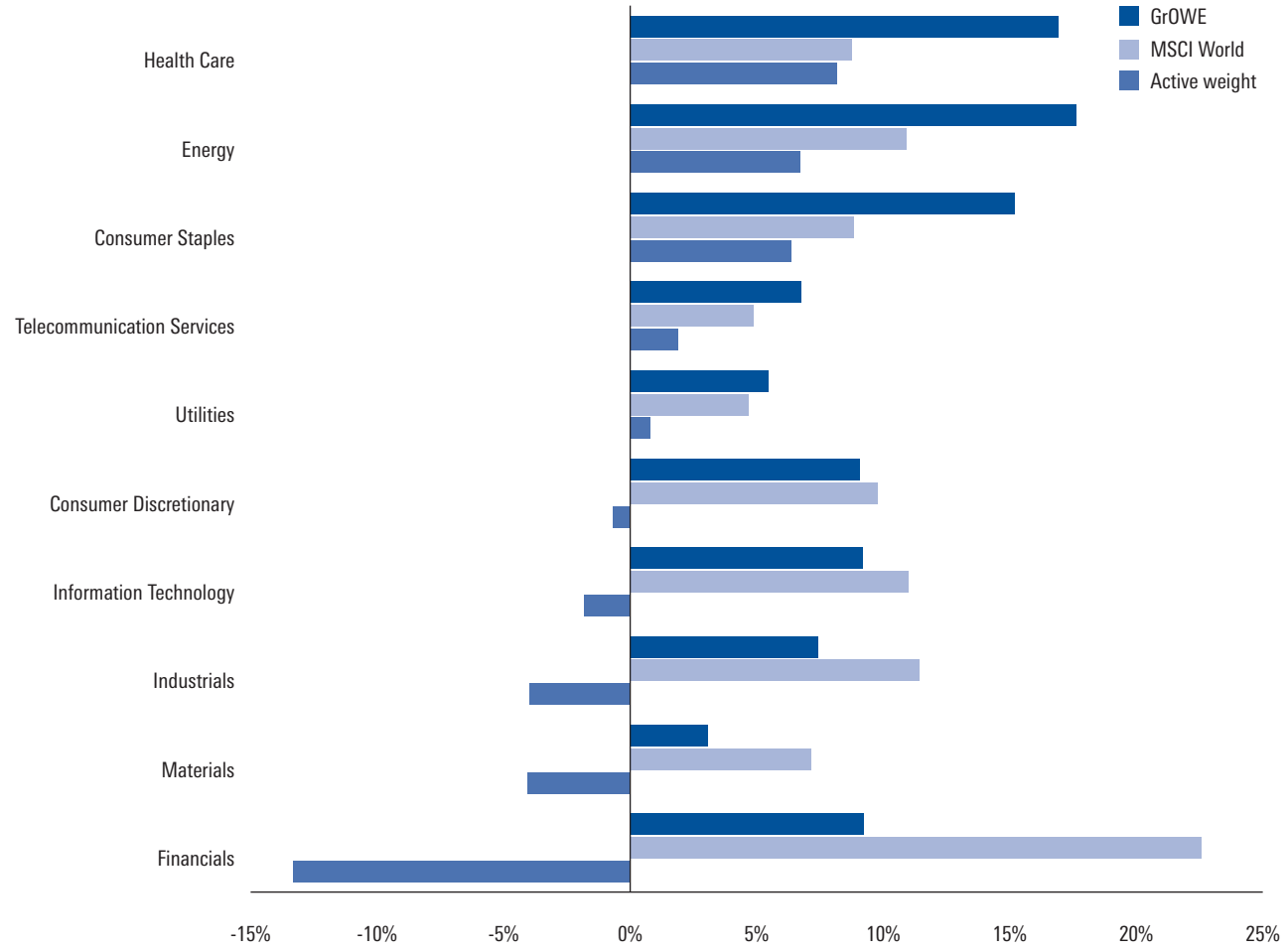
Figure 12 displays active sector weights, in descending order of magnitude. The greatest underweight is in Financial stocks, driven by the fact that this is the largest global sector—22.6% of the index—whose stocks correlate strongly not only with one another but with the stocks of several other sectors as well. The large U.S. and European financial companies—except those in the Americas Diversified Financials group—currently fall into cluster 1, along with many of the Industrials, Materials, and Consumer Discretionary stocks. Because this cluster is so large, its member risk units are significantly underweighted.

Of all the risk units making up the Financials sector, only those based in Asia and Americas Diversified Financials manage to break free of the strong sector correlations in the December 2007 portfolio. Asia Financials cluster according to region. It is interesting that Americas Diversified Financials cluster with Information Technology and Telecommunications in cluster 4, leaving cluster 1 and cluster 4 as the two dominant clusters in 2007.

Figure 12: Sector weights for December 2007



Source: DB Advisors Quantitative Strategies Research Group

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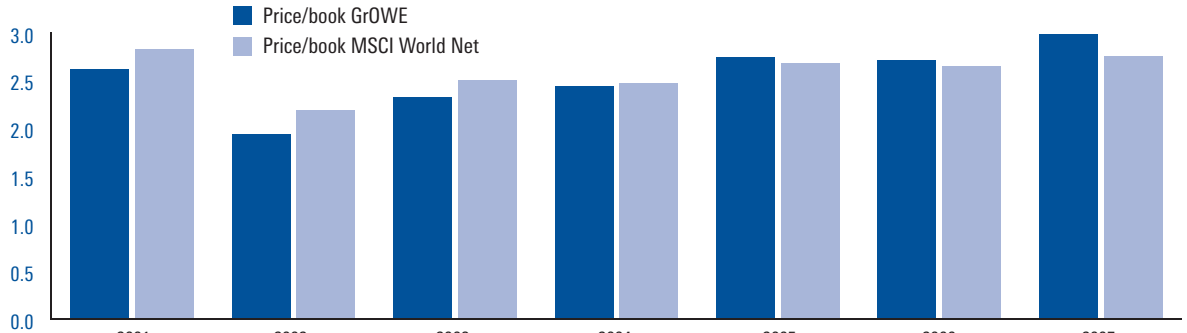
Style exposures

The GrOWE portfolio construction process does not actively target style biases, although we can try to identify them retroactively. We base our review on a bottom-up approach to style exposures, as we did to country and sector exposures. From this analysis during the live period of returns, we have not found any persistent size or style bias.

First we compute the average price-to-book (P/B) ratio and the average market capitalization[4] for both the GrOWE portfolio and the index, at each year-end in the live period. Figure 13 shows that the P/B ratio of GrOWE was somewhat low for the first four years, but more recently it has drifted slightly above that of the benchmark.[5]

Figure 14 presents the corresponding analysis for size. GrOWE had a slight small-cap bias in 2002–2004 as well as in 2006, but a slight large-cap bias in the other three years. Basically what we are seeing here is that there is no persistent size bias in our GrOWE strategy.

Figure 13: Price/book since inception



	2001	2002	2003	2004	2005	2006	2007
Price/book GrOWE	2.61	1.93	2.32	2.43	2.74	2.71	2.98
Price/book MSCI World Net	2.82	2.18	2.50	2.47	2.68	2.64	2.75

Source: DB Advisors Quantitative Strategies Research Group

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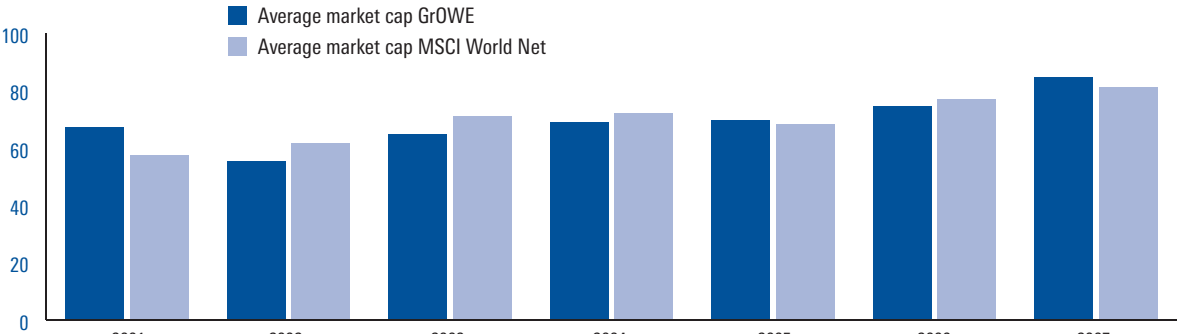
Figure 14: Market Capitalization since inception (in millions)



	2001	2002	2003	2004	2005	2006	2007
Average market cap GrOWE	67.27	55.17	64.64	68.77	69.78	74.35	84.47
Average market cap MSCI World Net	57.57	61.7	70.84	71.88	68.38	76.96	81.12

Source: DB Advisors Quantitative Strategies Research Group

For illustrative purposes only. The characteristics are based on a representative portfolio, which is included in the composite. A client's account may differ due to specific guidelines and restrictions.

[4]The average P/B ratio for a portfolio is computed as a "harmonic mean." This is the total price of the portfolio divided by the total book value; i.e., it is simply the P/B ratio of the portfolio. For the average capitalization of stocks in a portfolio, we use a portfolio-weighted average rather than the usual arithmetic average. This measure of average capitalization has the important property that it is insensitive to the presence of many small positions as long as their total portfolio weight is small.

[5]A parallel analysis of price/earnings ratios tells the same story, and so is not presented.

The Next Generation: GrOWE Plus

As the result of our research effort to further improve our GrOWE methodology, we have developed GrOWE Plus, which allows us to add even more diversification to the GrOWE concept.

The GrOWE Plus strategy has the same objective and philosophy as GrOWE, but uses more granular risk units than GrOWE by dividing the investment universe by country and sector rather than by region and sector as we do for GrOWE. The cluster and weighting procedures are identical. If compared with the MSCI World Index, GrOWE Plus has a higher active risk than GrOWE.

When comparing GrOWE Plus and GrOWE we gain some insights into the diversification effects and the expected growth rate. Dividing the global equity universe by country rather than region leads to:

- An increased number of clusters
- An increased volatility between clusters
- A lower correlation between clusters
- A higher expected growth rate

As with GrOWE, we backtested the performance from March 1985 to July 2001. In Figure 15, you can see how the GrOWE Plus strategy offers higher absolute returns at a slightly higher risk—and therefore better risk-adjusted returns (Sharpe ratio 0.7).

The picture looks consistent, if we compare hypothetical GrOWE Plus returns with live GrOWE performance since portfolio inception in August 2001 (see Figure 16). GrOWE Plus performance appears to capture the benefits of what is known as market value indifference and diversification bonus even better than GrOWE.

GrOWE EAFE

In addition to GrOWE World, we also offer a GrOWE EAFE strategy.

GrOWE EAFE's portfolio construction changed in January 2006 to follow that of GrOWE Plus—broken down by country instead of by region as in GrOWE. GrOWE EAFE has performed well since its inception in February 2002 to December 31, 2007, providing an annualized return of 16.1% with an annualized volatility of 13.7%. This results in a Sharpe ratio of 1.0%.*

*Past performance is not indicative of future results.

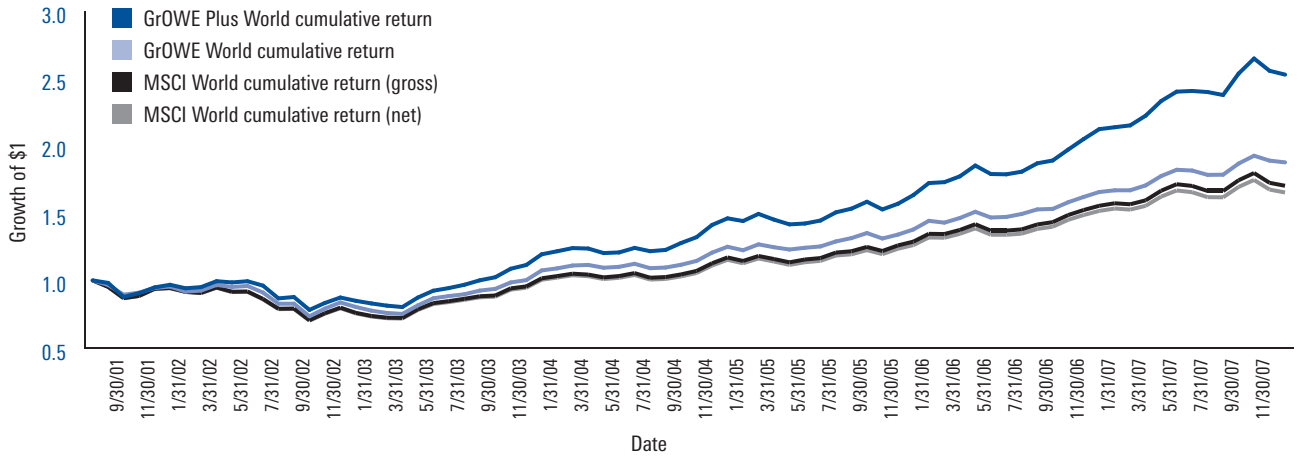
Figure 15*: GrOWE Plus backtest performance—March 1985 to July 2001

Portfolio	Annualized return	Annual volatility	Beta	Active risk	Excess return	Sharpe ratio
GrOWE Plus backtest	16.1%	15.5%	99.0%	7.0%	3.0%	0.7
GrOWE backtest	14.8%	14.8%	95.8%	4.1%	1.7%	0.6
MSCI World gross USD	13.1%	14.9%	100%	0	0	0.5

Source: DB Advisors Quantitative Strategies Research Group

*Results represent backtested information based on a model portfolio. No representation is being made that any portfolio will, or is likely to, replicate the information shown. A client's account may differ due to specific guidelines and restrictions. Past performance is no guarantee of future results. Both backtest and benchmark returns are considered gross of withholding tax.

Figure 16†: GrOWE Plus, GrOWE and benchmark cumulative returns (growth of $1)—August 2001 (since inception) to December 31, 2007



Source: DB Advisors Quantitative Strategies Group. Data shown is from August 2001 to December 2007.

†Results for GrOWE are from a live composite launched in August 2001. Results for GrOWE Plus represent backtested information based on a model portfolio and are gross of withholding tax. No representation is being made that any portfolio will, or is likely to, replicate the information shown. A client's account may differ due to specific guidelines and restrictions. Past performance is no guarantee of future results.

Summary

GrOWE and GrOWE EAFE are good core World and EAFE equity strategies for investors.

Key benefits include:

- **Better risk-adjusted returns:** GrOWE has a higher level of diversification than market cap-weighted indices leading to higher risk-adjusted returns (return/risk).[6]
- **Less downside risk:** GrOWE's higher level of diversification has led to smaller losses when equity markets have declined.[6]
- **Low correlation to other enhanced/active managers:** GrOWE's added value comes from superior portfolio construction, not security selection, leading to low correlation of excess return compared to traditional enhanced and active managers.

GrOWE is a total-return strategy that provides equity market exposure in a way that generates higher risk-adjusted returns than market capitalization-weighted indexing. GrOWE seeks to do this by:

1 | Identifying and efficiently capturing the key drivers of equity market returns

2 | Creating a more diversified portfolio to increase risk-adjusted returns

3 | Rebalancing the portfolio to capture changes in markets

The GrOWE investment process combines region/sector risk units of stocks into groupings called clusters. More highly correlated risk units are assigned to the same cluster. GrOWE assigns an equal weight to each cluster and an equal weight to each risk unit within a cluster to maximize diversification potential.

This process is designed to capture the benefits of a higher level of diversification by taking into account the primary drivers of equity market returns, sector and region, in a systematic way. GrOWE also seeks to maintain a high level of diversification through quarterly rebalancing, which aids in "selling high" and "buying low."

GrOWE has performed well from its inception in August 2001 to December 2007, offering an annualized return of 10.3% with an annualized volatility of 12.1%. This results in a Sharpe ratio of 0.6, which shows it is able to generate better absolute risk-adjusted returns. The Sharpe ratio of 0.6 in the long backtest period from 1985 to 2001 is the same as during the live period, which shows that historically it would have also produced better risk-adjusted returns.

Most of GrOWE's risk comes from active country and sector positions. GrOWE exhibited no persistent size or style bias during the live performance history and only modest exposures to size and value biases at any given time if compared with the MSCI World Equity index.

GrOWE World Plus offers additional potential for better absolute risk-adjusted returns. It applies the same objective and philosophy as GrOWE, but uses a more granular methodology.[6] Risk units in GrOWE World Plus are broken down by country rather than by region.

The backtest results for GrOWE Plus and live performance for GrOWE EAFE are very compelling. Exploiting the benefits of diversification allows the product to achieve absolute risk-adjusted returns above the MSCI World and MSCI EAFE indices.

[6]No assurance can be given that this will continue in the future.

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Technical Appendix:
The theory of the diversification bonus

In this appendix we explain the mathematical formula underlying Figure 2. The setting is that we have a number n of assets with the same mean μ and volatility σ, and with the same correlation ρ between any two. To help fix the meaning of these parameters, the following explains what each parameter represents in the case of GrOWE and gives a typical value of that parameter.

- n represents the number of assets/clusters, which is 6.
- μ represents the expected return on any cluster; its actual value is not needed to determine the diversification bonus.
- σ represents the typical cluster volatility, which we take to be 25%.
- ρ represents the typical correlation between clusters, which has been about 0.45.

Our approach to identifying the diversification bonus is as follows. We write down the formula for the expected growth rate g of a general portfolio of these assets. The expected growth rate is defined as the expected value of the logarithm of the portfolio return over a unit of time. (If we do not assume returns to be independent and identically distributed, the growth rate is defined as an average of expected log returns over time.) From this we get a formula for the difference in growth rates between an equally-weighted portfolio and a single asset. This is the diversification bonus shown in Figure 2.

Write R_i for the return on asset i, and write R_P for the return on an equally-weighted portfolio of these assets. With the μ_P and σ_P representing portfolio mean and portfolio volatility, we have

$$\mu_P = \mu \text{ and } \sigma_P^2 = \frac{\sigma^2}{n}\left(1+(n-1)\rho\right).$$

The expected growth rate of a portfolio P is defined as

$$g_P = E(\log R_P). \quad \text{(A1)}$$

Using a Taylor expansion of the log in (A1) we get the approximation

$$g_P \approx E\left(R_P - \frac{R_P^2}{2}\right) \approx \mu_P - \frac{\sigma_P^2}{2}. \quad \text{(A2)}$$

This approximation is exact in continuous time.[7] In the special case of only one asset this becomes $g_P = \mu - \sigma_P^2/2.$ The difference between this and (A2) is the diversification bonus, which is given by the following formula.

Diversification bonus=

$$\left(\mu - \frac{\sigma^2}{2n}\left(1+(n-1)\rho\right)\right) - \left(\mu - \frac{\sigma^2}{2}\right) = \frac{\sigma^2}{2n}(n-1)\left(1-\rho\right) \quad \text{(A3)}$$

The latter expression is seen to be 0 if either n=1, in which case there is no diversification because there is only one asset, or if ρ=1, in which case there is no diversification because all assets are perfectly correlated. The expression on the right side of (A3) is the quantity that is charted in Figure 2.

In the case of GrOWE, with the parameter choices given at the start of this appendix, we find from equation (A3) that the theoretical diversification bonus is given by

Diversification bonus =

$$\frac{\sigma^2}{2n}(n-1)\left(1-\rho\right) = \frac{.25^2}{12}(5)\left(.6\right) = .015625,$$

and this confirms the value in Figure 2 corresponding to six assets with correlation 0.45.

[7]Further technical details may be found, for example, in Bernstein and Wilkinson (1997).

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I-001382-5.0 (04/08)

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GrOWE (World) Composite: Composite Description

Schedule of Investment Performance for the Period 08/01/01 - 12/31/07
Benchmark: MSCI World Total Return Net Index (see disclosure notes for benchmark history)

Period Ending (a)	Rates of Return (%)			No of Accounts (c)	Composite Assets (c) ($m)	Firm Assets (d) ($m)	% of Firm Assets (d)	Standard Deviation (e)
	Composite Gross of Fees	Composite Net of Fees	Benchmark (b)					
2007	13.30	13.16	9.04	2	663.75	246,375.65	0.27	0.05
2006	20.17	20.02	20.07	3	625.29	221,662.55	0.28	0.01
2005	10.25	10.11	9.49	3	499.43	219,644.18	0.23	0.03
2004	16.36	16.21	14.72	2	334.15	252,862.40	0.13	N/A
2003	33.77	33.59	33.11	1	204.37	203,043.97	0.10	N/A
2002	-15.86	-15.97	-20.09	1	157.43	305,853.79	< 0.1	N/A
2001	-4.58	-4.63	-5.17	1	187.11	222,073.96	< 0.1	N/A
YTD	13.30	13.16	9.04	2	663.75			
08/01/01 to 12/31/07 (f)	10.30	10.16	8.21					

Notes:
a) Inception and/or termination period of performance may not comprise a full year; see reporting period dates above. The periods prior to 2002 are not covered by Independent Accountant's Report.
b) MSCI Provisional World Net Dividends blended with MSCI World Total Return Net Index after 5/31/02. Due to differences in sources for benchmark performance, there may be slight variances between benchmark returns noted above and those from other published sources. Benchmark returns are not covered by Independent Accountant's Report.
c) Represents data at the end of the stated period
d) Calendar year-end
e) Asset-weighted standard deviation; calculated for gross returns for composites with five or more portfolios active over the full year
f) Annualized performance for the time period used by Deutsche Asset Management Americas to report performance for the composite. Not covered by Independent Accountant's Report.
See Accompanying Notes, 1 through 6, below

1) Basis of Presentation
Deutsche Asset Management Americas (the "Firm") is a division of Deutsche Asset Management worldwide and includes all portfolios (except nontraditional assets) managed for the Firm by Deutsche Bank Trust Company Americas, Deutsche Asset Management Canada Ltd., Deutsche Investment Management Americas Inc. and DWS Trust Company. The Firm has prepared and presented this report in compliance with the Global Investment Performance Standards (GIPS®). This presentation of investment performance sets forth the time-weighted gross and net rates of return for the GrOWE (World) Composite (the "Composite") for the period shown. Past performance is no guarantee of future results and may differ in future time periods. Additional information regarding the Firm's policies and procedures for calculating and reporting performance results is available upon request.

2) Selection Criteria and Valuation Procedures
The Composite includes all fee-paying portfolios managed on a fully discretionary basis by the Firm, according to the Composite strategy which seeks to maximize long-term growth. Eligible new portfolios are added to the Composite immediately following the first complete month the portfolio is managed by the Firm. Securities listed on any national securities exchange are valued at their last trade price. Securities that are not listed are valued at the most recent publicly quoted bid price. Securities transactions are recorded on a trade date basis. Dividend income is recorded as of the ex-dividend date. Returns reflect investment of dividends and other earnings. This composite was created September 3, 2002.

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GrOWE (World) Composite: Composite Description

Schedule of Investment Performance for the Period 08/01/01 - 12/31/07
Benchmark: MSCI World Total Return Net Index (see disclosure notes for benchmark history)

3) Calculation of Rates of Return
Composite returns are expressed in US dollars. For each portfolio within the Composite, the total rate of return for the time period is equal to the change in the value of the portfolio, including capital appreciation, depreciation and income, as a percentage of the beginning market value of the portfolio, adjusted for the net of all contributions and withdrawals (the "cash flows"). Each cash flow is weighted from the actual date of contribution or withdrawal in the month it occurred. The results for the Composite for all periods shown net of withholding taxes, where applicable, on dividends, interest, and capital gains.

Rates of return are calculated on a "time-weighted" basis for all investments. Time-weighted rates of return minimize the effect of cash flows on the investment performance of the portfolio. Annual Composite rates of return are derived by geometrically linking monthly Composite rates of return. Monthly Composite rates of return are computed utilizing each portfolio's monthly rate of return within the Composite. Asset-weighted returns are weighted by their respective beginning market values. Rates of return are presented both gross and net of investment fees and include the deduction of transaction costs. The highest separate account fee for this investment strategy is 0.35% per year. Net of fee returns are based on actual fees. A complete description of fees is available in form ADV part II. The fee schedule may be discounted subject to negotiation.

The standard deviation of comparable performance over time is a measure of dispersion. This calculation measures the fluctuation of the rates of return of portfolios with the Composite in relation to the average return.

4) Composite Benchmark
Composite returns are benchmarked to the MSCI World Total Return Net Index. The benchmark is used for comparative purposes only and generally reflects the risk or investment style of the investments reported on the schedule of investment performance. The MSCI World Total Return Net Index is a free float-adjusted market capitalization index designed to measure global developed market equity performance. As of February 2002, the MSCI World Total Return Net Index consisted of 23 developed market country indices. The Net dividends series approximates the minimum possible dividend reinvestment. The dividend is reinvested after deduction of withholding tax, applying the rate to non-resident individuals who do not benefit from double taxation treaties. MSCI uses withholding tax rates applicable to Luxembourg holding companies, as Luxembourg applies the highest rate. Investments made by the Firm for the portfolios it manages according to the Composite strategy may differ from those of the Benchmark. Accordingly, investment results will differ from those of the Benchmark.

For the period from August 2001 to May 2002, the composite was benchmarked against the MSCI Provisional World Net Dividends Index. The benchmark changed when the MSCI Provisional World Net Dividends Index was discontinued.

5) List of the Firm's Composites
In addition to the Composite, the Firm provides investment management services utilizing different strategies. A complete list and descriptions of the Firm's composites are available upon request within a reasonable timeframe.

6) Significant Events
On 12/04/2001, Deutsche Bank and Zurich Financial Services ("Zurich") announced they signed Definitive Agreements under which Deutsche Bank would acquire 100% of Zurich Scudder Investments, Inc. ("Scudder"). The transaction was effective close of business 04/05/2002, at which time Zurich Scudder Investments, Inc. was renamed Deutsche Investment Management Americas, Inc. This presentation therefore includes Deutsche Investment Management Americas Inc., Scudder Trust Company and Deutsche Asset Management Canada Limited.

On 07/07/2005, Deutsche Bank announced they signed Definitive Agreements under which Deutsche Bank would sell Deutsche Asset Management Investment Services Ltd. to Aberdeen Asset Management. The transaction was effective close of business 12/01/2005.

On 12/31/2006 Deutsche Asset Management, Inc. ("DAMI") merged into Deutsche Investment Management America ("DIMA").

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GROWE EAFE Composite: Composite Description

Schedule of Investment Performance for the Period 02/01/02 - 12/31/07
Benchmark: MSCI EAFE Total Return Net Index

Period Ending (a)	Rates of Return (%)			No of Accounts (c)	Composite Assets (c) ($m)	Firm Assets (d) ($m)	% of Firm Assets (d)	Standard Deviation (e)
	Composite Gross of Fees	Composite Net of Fees	Benchmark (b)					
2007	15.42	15.08	11.17	1	29.73	246,375.65	< 0.1	N/A
2006	29.84	29.45	26.34	1	29.63	221,662.55	< 0.1	N/A
2005	11.08	10.75	13.54	1	106.74	219,644.18	< 0.1	N/A
2004	19.47	19.11	20.25	1	89.65	252,862.40	< 0.1	N/A
2003	43.10	42.67	38.59	1	60.99	203,043.97	< 0.1	N/A
2002	-12.77	-13.05	-11.22	1	39.17	305,853.79	< 0.1	N/A
YTD	15.42	15.08	11.17	1	29.73			
02/01/02 to 12/31/07 (f)	16.61	16.25	15.61					

Notes:
a) Inception and/or termination period of performance may not comprise a full year; see reporting period dates above
b) MSCI EAFE Net Index. Due to differences in sources for benchmark performance, there may be slight variances between benchmark returns noted above and those from other published sources. Benchmark returns are not covered by Independent Accountant's Report.
c) Represents data at the end of the stated period
d) Calendar year-end
e) Asset-weighted standard deviation; calculated for gross returns for composites with five or more portfolios active over the full year
f) Annualized performance for the time period used by Deutsche Asset Management Americas to report performance for the composite. Not covered by Independent Accountant's Report.
See Accompanying Notes, 1 through 6, below

1) Basis of Presentation
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2) Selection Criteria and Valuation Procedures
The Composite includes all fee-paying portfolios managed on a fully discretionary basis by the Firm, according to the Composite strategy which seeks to maximize long-term growth. Eligible new portfolios are added to the Composite immediately following the first complete month the portfolio is managed by the Firm. Securities listed on any national securities exchange are valued at their last trade price. Securities that are not listed are valued at the most recent publicly quoted bid price. Securities transactions are recorded on a trade date basis. Dividend income is recorded as of the ex-dividend date. Returns reflect investment of dividends and other earnings. This composite was created September 3, 2002.

3) Calculation of Rates of Return
Composite returns are expressed in US dollars. For each portfolio within the Composite, the total rate of return for the time period is equal to the change in the value of the portfolio, including capital appreciation, depreciation and income, as a percentage of the beginning market value of the

GROWE EAFE Composite: Composite Description

Schedule of Investment Performance for the Period 02/01/02 - 12/31/07
Benchmark: MSCI EAFE Total Return Net Index

portfolio, adjusted for the net of all contributions and withdrawals (the "cash flows"). Each cash flow is weighted from the actual date of contribution or withdrawal in the month it occurred. The results for the Composite for all periods shown net of withholding taxes, where applicable, on dividends, interest, and capital gains.

Rates of return are calculated on a "time-weighted" basis for all investments. Time-weighted rates of return minimize the effect of cash flows on the investment performance of the portfolio. Annual Composite rates of return are derived by geometrically linking monthly Composite rates of return. Monthly Composite rates of return are computed utilizing each portfolio's monthly rate of return within the Composite. Asset-weighted returns are weighted by their respective beginning market values. Rates of return are presented both gross and net of investment fees and include the deduction of transaction costs. The highest separate account fee for this investment strategy is 0.35% per year. Net of fee returns are based on actual fees. A complete description of fees is available in form ADV part II. The fee schedule may be discounted subject to negotiation.

The standard deviation of comparable performance over time is a measure of dispersion. This calculation measures the fluctuation of the rates of return of portfolios with the Composite in relation to the average return.

4) Composite Benchmark
Composite returns are benchmarked to the MSCI EAFE net index. The MSCI EAFE Index (Europe, Australasia, Far East) is a free float-adjusted market capitalization index that is designed to measure the equity market performance of developed markets, excluding the U.S. and Canada. As of June 2007, the index consisted of the following 21 developed market indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Switzerland, Sweden and the United Kingdom. This benchmark is being retroactively applied from inception to the present. The reason for this change is the MSCI EAFE is a more relevant benchmark given the underlying investments. The benchmark is used for comparative purposes only and generally reflects the risk or investment style of the investments reported on the schedule of investment performance.

Composite returns were previously benchmarked to the MSCI World ex US Total Return Net Index. The MSCI World ex US Total Return Net Index is a free float-adjusted market capitalization index designed to measure global developed market equity performance. As of February 2002, the MSCI World ex US Total Return Net Index consisted of 23 developed market country indices. The Net dividends series approximates the minimum possible dividend reinvestment. The dividend is reinvested after deduction of withholding tax, applying the rate to non-resident individuals who do not benefit from double taxation treaties. MSCI uses withholding tax rates applicable to Luxembourg holding companies, as Luxembourg applies the highest rate. Investments made by the Firm for the portfolios it manages according to the Composite strategy may differ from those of the Benchmark. Accordingly, investment results will differ from those of the Benchmark. Previously, for periods from February 2002 to May 2002, the composite was benchmarked against the MSCI Provisional World ex US Index. The benchmark changed when the MSCI Provisional World ex US Index was discontinued.

5) List of the Firm's Composites
In addition to the Composite, the Firm provides investment management services utilizing different strategies. A complete list and descriptions of the Firm's composites are available upon request within a reasonable timeframe.

6) Significant Events
On 12/04/2001, Deutsche Bank and Zurich Financial Services ("Zurich") announced they signed Definitive Agreements under which Deutsche Bank would acquire 100% of Zurich Scudder Investments, Inc. ("Scudder"). The transaction was effective close of business 04/05/2002, at which time Zurich Scudder Investments, Inc. was renamed Deutsche Investment Management Americas, Inc. This presentation therefore includes Deutsche Investment Management Americas Inc., Scudder Trust Company and Deutsche Asset Management Canada Limited.

On 07/07/2005, Deutsche Bank announced they signed Definitive Agreements under which Deutsche Bank would sell Deutsche Asset Management Investment Services Ltd. to Aberdeen Asset Management. The transaction was effective close of business 12/01/2005.

On 12/31/2006 Deutsche Asset Management, Inc. ("DAMI") merged into Deutsche Investment Management America ("DIMA").

7) Composite name change
The composite name was changed from the GrOWE ex US Composite to GrOWE EAFE Composite on July 1, 2007.