Global Style Investing

Region-neutral and industry-neutral value portfolios.

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Fama and French [1995, 1998] show that the cross-sectional variation in security prices across countries can be explained by a global market factor and a global value factor. The global value factor is obtained from a capitalization-weighted aggregation of nationally based value factors, where the capitalization weights are the weights of each country in the world index.

The Fama-French research supports the construction of global value benchmarks provided by S&P/Citigroup, FTSE, and MSCI. Implicitly, these benchmarks suggest the global value premium is best captured through investments that are *country-neutral* relative to the world benchmark.

The increasing globalization of business enterprise activities has presented new challenges and new opportunities for asset management. Cavaglia et al. [2004] review recent empirical evidence supporting the view that country factors as a determinant of security returns have become less important while global industry factors have become more important.

This would suggest asset managers might wish to consider alternative ways of capturing the global value premium. And a natural alternative to the current country-neutral approach is an *industry-neutral* approach.

We aim to document the risk and return properties of portfolios constructed under these approaches and to understand the drivers of performance for these portfolios. We compare the performance of global value portfolios constructed on a region-neutral and on an industry-neutral basis. The premium accruing to a regional value strategy has been well documented; see, for example, Fama and French [1998] for a well-cited international study. The premium accruing to a relative value industry strategy has been less investigated. Breen [1968], Fuller, Huberts, and Levinson [1993], and Dreman and Lufkin [1997] have studied this strategy in the U.S. market, but to the best of our knowledge it has not been studied in a global market.

The regionally neutral value portfolio is built by selecting all stocks with high fundamental-to-price ratios in a region to form an absolute value regional portfolio, and then aggregating all these regional portfolios to form the regionally neutral value portfolio. The sector-neutral value portfolio is formed by selecting all stocks with high fundamentals-to-price in a global industry to form a relative value industry portfolio, and aggregating across all industries to form the industry-neutral value portfolio. These are often called absolute value and relative value investment strategies.[1]

Our findings may be summarized as follows:

1. We find a value premium, of 1.5% per year, in all our absolute value regional portfolios and a positive value premium in nearly all the global relative value industry portfolios, although the premium is significantly higher than 1.5% in some industries.
2. The absolute value premium and relative value premium are approximately equal, but the absolute value premium accrues cyclically over time, while the relative value premium accrues more consistently. Capturing the absolute value premium, therefore, appears riskier and provides a lower Sharpe ratio strategy than that gained in capturing the relative value premium.
3. The returns to absolute value regional portfolios are correlated across regions, while the returns to the relative value industry portfolios are only weakly correlated across industries. This suggests that the gains from diversification across value-based industry portfolios are likely to be greater than those based on country or regionally based value-tilted portfolios.
4. The performance of the regionally neutral value portfolio can be replicated by a weighted average of industry indexes, while the industry-neutral value portfolio cannot be replicated by a weighted average of regional indexes. This suggests that regionally neutral value-tilted portfolios are exposed to a common, cyclical risk factor. This does not appear to hold for industry-neutral value portfolios.
5. For each region and industry we construct a portfolio based on the stocks with the lowest future expected growth rates. This portfolio is therefore constructed without the use of any price information. We find that the returns to this *not-growth* regional portfolio are highly correlated with the returns to the absolute value regional portfolios, while the returns to the *not-growth* industry portfolios are not correlated with the industry relative value portfolios.
6. We replicate results in Liew and Vassalou [2000], and show that the returns to the absolute value regional portfolios are able to forecast future gross domestic product growth while the returns to the industry-neutral value portfolio appear to have no forecasting power. Thus, the absolute value premium appears to be a state variable that predicts future changes in the investment opportunity set in the context of Merton's [1973] intertemporal asset pricing model; this does not appear to hold for the relative value premium.

The asset allocation implications of our findings are that a global country-neutral value-tilted investment strategy will earn a premium over the world return; this comes as a result of bearing some systematic cyclical risk that may be difficult to diversify and that is highly correlated with the performance of particular industries. A global industry-neutral value-tilted investment strategy offers a similar return payoff with less volatility; this return premium does not appear to be associated with the systematic risk factors we consider.

EXHIBIT 1
Annualized Value Premium and Return Spread Between Portfolios

Absolute Value Portfolios	**Return Spreads**	**Value Premium**			
	Dec-93 to Feb 05	**Dec-93 to Feb-05**	**Dec-93 to Jan-00**	**Jan 00 to Feb-05**	**p-value**
World Region-Neutral	4.21%	1.46%	-2.84%	6.94%	(0.010)
North America	3.28%	0.91%	-4.17%	7.45%	(0.018)
UK	4.76%	1.53%	-2.97%	7.30%	(0.007)
Euro Bloc	5.03%	1.72%	-1.06%	5.21%	(0.052)
Rest of Europe	0.80%	0.02%	-1.45%	1.84%	(0.339)
Pacific ex Japan	4.57%	2.22%	-1.52%	6.97%	(0.020)
Japan	5.87%	2.50%	-1.75%	7.93%	(0.031)

P-values are for two-tailed test that the two subsamples have the same mean.

Thus an industry-neutral strategy seems to be the more appropriate strategy for capturing the global value premium. Index vendors may want to construct new benchmarks that reflect this investment style.

PERFORMANCE OF REGIONAL ABSOLUTE VALUE PORTFOLIOS

We call the regional components of the region-neutral value portfolio *the regional absolute value portfolios*. The similarly named indexes are then calculated from the returns to these portfolios. The appendix describes the data in detail and how these value portfolios are constructed on the basis of observed fundamental-to-price ratios.

We use as the stock universe all stocks in the FTSE World Developed Index from December 1993 through January 2005. Our portfolio construction approach is almost identical to the method FTSE uses for its Developed Value index.

FTSE describes its published index as a composite value index. The term *composite* refers to averaging a ranking based on fundamental-to-price ratios, the *value style ranking*, and a ranking based on past and future earnings growth, the *growth style ranking*. Their portfolio weights are then a simple function of this composite ranking, called the *overall style ranking* (OSR). Our portfolio weights, rather than being a function of the overall style ranking, are based on the value style ranking only.

Apart from this difference, our approach is identical to the FTSE approach. In fact, we first replicated the returns to all the relevant FTSE value indexes. For this, we are grateful to FTSE for making available its database and considerable expertise.

Our decision to use the value style ranking as the working definition of value was motivated partly by a desire to ensure comparability with other studies; almost all previous work on the value premium has used a fundamental-to-price ratio to distinguish a value stock. More important, though, it enables us to follow Bourguignon and de Jong's [2003] suggestion, and differentiate a value from a not-growth strategy.

By a value strategy, we refer to the performance of our portfolios constructed on the basis of the FTSE value style ranking, and by not-growth we refer to the performance of portfolios constructed on the basis of the FTSE growth style ranking. This enables us to analyze the relationship between the returns to value and the returns to not-growth by both region and by industry.

EXHIBIT 2
Performance of Region-Neutral and Regional Absolute Value Indexes

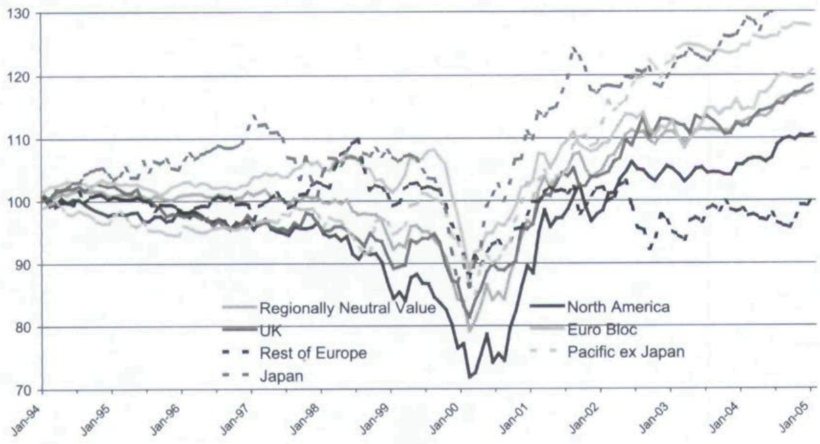

EXHIBIT 3
Annualized Volatility of and Correlation Between Returns to Regional Absolute Value Portfolios

	AWD	North America	UK	Euro Bloc	Rest of Europe	Pacific ex Jpn	Japan
World Region-Neutral	**4.97%**	0.97	0.68	0.59	0.51	0.44	0.45
North America	0.95	**6.65%**	0.56	0.47	0.44	0.44	0.30
UK	0.57	0.44	**4.86%**	0.51	0.29	0.20	0.33
Euro Bloc	0.64	0.48	0.59	**4.63%**	0.36	0.15	0.13
Rest of Europe	0.08	0.00	0.23	0.28	**5.39%**	0.12	0.32
Pacific ex Japan	0.45	0.43	0.17	0.09	-0.19	**4.98%**	0.27
Japan	0.36	0.18	0.09	0.14	-0.17	0.27	**6.26%**

Exhibit 1 reports the absolute value premium and the absolute value/not-value spread over the sample period.[2] The absolute value premium is defined as the average return to the regional absolute value portfolios in excess of its respective market; the spread is the average return in excess of the regional absolute not-value portfolio. The premiums and spreads are roughly similar across regions (although they are smaller in the "rest of Europe" region). The average spread of 4.21% is slightly lower than many estimates in the literature (e.g., Fama and French [1998]) but is broadly similar.

Although the average spread is positive in every region, the return accrues erratically over the sample period. To demonstrate this, we split the sample period into two, the period before and after the peak of the tech boom. It will be of little surprise that return spreads are negative prior to the boom and positive afterward. The null hypothesis that the two subsamples have the same mean can be rejected in all regions (except the rest of Europe) at any significance greater than 5.2%.

Correlation of Absolute Value Portfolio Returns across Regions

Exhibit 2 plots the regionally neutral and the six regional absolute value indexes relative to their respective markets; all indexes are set at 100 in the first period of the data sample, i.e., December 1993. The plots prompt two immediate observations: first we see the coherence or correlation of the indexes (except, again, for the rest of Europe) and second the severity of the tech boom and bust between July 1999 and January 2001.

These observations are quantified in Exhibit 3. All returns are measured relative to their respective market. The principal diagonal reports the volatility or annualized standard deviation of the returns. Thus the volatility of the regionally neutral value strategy relative to the all- world developed market (AWD) is 4.97%.

The top right-hand corner records the correlation coefficient between the respective returns to the regional value portfolios over the entire sample period. All regions, except Japan, have a correlation coefficient equal to or greater than 0.44 with North America.

Further, the western group of regions, North America, the U.K., and the Euro bloc are all highly mutually correlated, with coefficients all equal to or greater than 0.47. We set this group off as these markets are recognized as being more integrated; see Brooks and Del Negro [2004], for example.[3]

In the lower left-hand corner of the table we record the same correlation coefficients calculated over the same sample but now omitting the data during the tech bubble (namely, July 1999–January 2000). This is to demonstrate that the results are only to a small extent driven by the high correlation in returns during this period. Omitting this interval reduces the market cap-weighted mean correlation coefficient among the western regions from 0.5 to 0.48. It has only a minor effect on the numbers corre-

EXHIBIT 4

Implicit Industry Tilts Within Regional Absolute Value Portfolios

	All World Developed		North America		UK		Euro Bloc		Japan	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Resources	76.1%	(6%)	83.8%	(6%)	75.7%	(13%)	69.1%	(13%)	95.9%	(5%)
Basic Industries	77.9%	(11%)	79.7%	(15%)	85.6%	(19%)	72.5%	(12%)	76.4%	(11%)
General Industrials	56.7%	(8%)	56.1%	(14%)	61.8%	(19%)	58.7%	(13%)	53.1%	(7%)
Cyclical Consumer Goods	68.9%	(6%)	82.9%	(6%)	69.8%	(30%)	69.1%	(15%)	58.6%	(16%)
Non-Cyclical Cons. Goods	30.2%	(7%)	31.1%	(10%)	25.2%	(12%)	16.4%	(10%)	45.6%	(11%)
Cyclical Services	42.7%	(5%)	41.8%	(8%)	35.9%	(12%)	37.2%	(9%)	55.4%	(8%)
Non-Cyclical Services	56.9%	(9%)	74.2%	(10%)	57.5%	(22%)	40.3%	(17%)	19.6%	(14%)
Utilities	88.8%	(4%)	95.3%	(4%)	78.3%	(11%)	75.9%	(18%)	97.2%	(4%)
Financials	55.9%	(10%)	65.9%	(6%)	55.3%	(11%)	54.7%	(9%)	33.5%	(16%)
Information Technology	21.2%	(10%)	16.2%	(6%)	20.9%	(31%)	13.0%	(14%)	51.1%	(17%)

EXHIBIT 5

Ability of Industry Portfolios to Reproduce Returns to Regional Absolute Value Indexes

	Value Premium Dec-93 to Feb 05	R^2	Constant, α (annualised)	Std. Error	β	Std. Error
Region-Neutral	1.46%	0.89	0.52%	(0.51%)	1.53	(0.05)
North America	0.91%	0.90	1.08%	(0.64%)	1.34	(0.04)
UK	1.53%	0.69	-1.43%	(0.84%)	1.42	(0.08)
Euro Bloc	1.72%	0.75	1.27%	(0.69%)	1.27	(0.06)
Rest of Europe	0.02%	0.84	0.43%	(0.64%)	1.04	(0.04)
Pacific ex Japan	2.22%	0.62	0.54%	(0.95%)	1.93	(0.13)
Japan	2.50%	0.74	0.44%	(0.98%)	1.48	(0.08)

sponding to the Pacific region, but does reduce the coefficients with respect to Japan.

The returns to a regional absolute value strategy are highly correlated across regions, particularly across the western regions. The market cap-weighted mean correlation is 0.4 for the full sample and 0.33 for the sample excluding the technology boom. This suggests there is an international component to the absolute value strategy and that it may be related to a pervasive risk factor. This will limit the ability of a fund manager pursuing an absolute value strategy to reduce risk by diversifying across regions.

Replicating the Returns to Absolute Value Portfolios Using Industry-Weighted Portfolios

The implied industry allocations of the absolute value portfolios can be used to construct regional portfolios with sector tilts; we show that the returns to these regional portfolios closely mimic the returns of the absolute value portfolios. These results suggest that stock-level mispricings do not drive the returns to our absolute value indexes. Rather, the returns to absolute value are driven by the same factors that determine the relative performance of sector indexes.

Exhibit 4 records the average industry tilt in our largest four regions. For each region, the column labeled mean gives the average percentage of the industry by market cap classified as value; the column labeled std. dev. states the standard deviation of this proportion over the sample. Thus of the resources stocks in the all-world developed index, on average 76.1% by market cap are classified as value over the sample period. Around this average the actual proportion in any period has a standard deviation of 6%. If there were no industry tilt in any region, then all mean proportions would be 50%.

Exhibit 4 shows that there are broadly the same large average industry tilts in every region. The regional absolute value portfolios are particularly overweight in resources, basic industries, cyclical consumer goods, and utilities, and underweight non-cyclical consumer goods, cyclical services, and information technology. Yet the industry tilts do vary over the sample and cycle.

For example, in the AWD universe, the value tilt in the resources industry varies from a minimum of 61% to a maximum of 89%. This is within almost two standard deviations of the mean.

EXHIBIT 6

Ability of Regional Absolute Not-Growth Indexes to Reproduce Returns to Regional Absolute Value Indexes

	R^2	β	Std. Err.	Constant, α (annualized)	Std. Err.	p-value
Region-Neutral	0.80	1.10	(0.05)	0.71%	(0.68%)	0.294
North America	0.85	1.08	(0.04)	-0.16%	(0.78%)	0.842
UK	0.50	0.74	(0.06)	0.78%	(1.05%)	0.458
Euro Bloc	0.38	0.89	(0.10)	1.76%	(1.09%)	0.108
Rest of Europe	0.06	0.26	(0.09)	-0.15%	(1.57%)	0.925
Pacific ex Japan	0.34	0.84	(0.10)	2.16%	(1.24%)	0.083
Japan	0.38	0.82	(0.09)	2.88%	(1.50%)	0.056

P-value refers to the probability of accepting the hypothesis that the constant is equal to zero.

Is the implicit industry rotation able to account for the return performance of our absolute value portfolios? For each region, we construct a portfolio whose returns are generated by the same industry rotation strategy implicit within the absolute value portfolios. This is achieved by weighting the returns to the local industries in the same proportion as observed in the absolute value portfolio. The weights are rebalanced every month.

We can then decompose the returns to any value portfolio into the proportion due to the industry rotation and a residual using the regression:

$$R_t^{Value} = \alpha + \beta R_t^{Industry\ Rotation} + \varepsilon_t \quad (1)$$

where R_t^{Value} and $R_t^{Industry\ Rotation}$ are the returns to the value and industry rotation strategies relative to their market.

The results for the regressions are given in Exhibit 5. A high R^2 indicates that a large proportion of the volatility of the regional value strategy can be explained by the implicit industry tilts within the value portfolio; this amounts to 89% across the world, and at least 62% in every region.

Furthermore, the implicit industry rotation strategy can explain a significant proportion of the absolute value premium. In every region except the rest of Europe, the constant in the regression is insignificant at the 10% level, suggesting that the majority of the performance of absolute value can be captured using an industry rotation strategy. It therefore does not appear that the outperformance of value is a result of stock-picking or mispricing at the stock level.

More significantly, from an asset allocation perspective, pursuing a regional value strategy exposes the investor to significant levels of risk associated with relative industry performance. Furthermore, since the betas are greater than 1.0, this implies that the risk has to do with a levered sector allocation. To the best of our knowledge, no proponent of value-based investment strategies has explicitly highlighted this embedded risk (see, for instance, Sinquefield [1996]).

Evidence that the Returns to Absolute Value are Driven by Fundamentals

In a discounted present value model, dividend yields can be expressed as a function of future expected returns and dividend growth rates.[4] Therefore, if stocks are fairly priced, the returns to absolute value should be correlated with the returns to portfolios constructed from low-growth stocks. Or, in the terminology of Bourguignon and de Jong [2003], value is likely to be correlated with not-growth.

Construction of our regional not-growth portfolios follows a simple variation on the approach used to construct the absolute value regional portfolios. Instead of ranking the stocks on the basis of price-to-fundamental ratios, the FTSE value style ranking, we rank them on the basis of expected future and past growth rates in earnings and sales, the FTSE growth style ranking.

We regress the returns to our regional not-growth portfolios and a constant on the returns to the respective absolute value portfolio. Thus, we estimate:

$$R_t^{Value} = \alpha + \beta R_t^{NotGrowth} + \varepsilon_t \quad (2)$$

where R_t^{Value} and $R_t^{NotGrowth}$ are the returns to the value and not-growth portfolios (see Exhibit 6). A high R^2 indicates that a high proportion of the value return volatility can be explained by the returns to not-growth; for both the region-neutral and the North America regional value portfolio, not-growth can explain over 80% of the variance to the absolute value strategy. The test that $\alpha = 0$ is a test of whether any premium to not-growth can explain the premium to value. We can accept this hypothesis at any standard level of significance for all our western regions.

These results demonstrate that at a regional level the returns to not-growth are very similar to the returns to value. This suggests that the absolute value premiums are compensation for bearing risk relating to economic growth.

EXHIBIT 7

Ability of Regional Absolute Value Indexes to Forecast Future GDP Growth

	All World Developed	North America	UK	Euro Bloc	Japan
R^2	0.75	0.55	0.61	0.63	0.32
Intercept$_{(t-4,\,t)}$: α	2.60%	3.65%	2.88%	1.55%	1.09%
	(0.22%)	(0.49%)	(0.28%)	(0.26%)	(0.28%)
Return to Absolute Value $_{(t-4,\,t)}$: β^{Value}	-0.041	-0.047	-0.045	-0.027	-0.019
	(0.012)	(0.02)	(0.012)	(0.015)	(0.03)
Market Return$_{(t-4,\,t)}$: β^{Market}	0.027	0.031	0.012	0.024	0.033
	(0.007)	(0.010)	(0.005)	(0.004)	(0.012)
Lagged GDP Growth$_{(t-4,\,t)}$: γ	-0.12	-0.213	-0.045	0.115	0.185
	(0.09)	(0.16)	(0.10)	(0.12)	(0.15)

Standard errors are corrected for hetereoscedascity and serial correlation for up to three lags using the Newey-West [1987] estimator.

EXHIBIT 8

Annualized Value Premium and Return Spread Between Value and Not Value

Relative Value Portfolios	Return Spreads	Value Premium			
	Dec-93 to Feb 05	Dec-93 to Feb-05	Dec-93 to Jan-00	Jan 00 to Feb-05	p-value
All-World Industry-Neutral	4.30%	1.69%	0.32%	3.38%	(0.080)
Resources	3.40%	1.21%	0.60%	1.97%	(0.434)
Basic Industries	8.25%	3.68%	3.56%	3.83%	(0.896)
General Industrials	2.87%	0.96%	-1.52%	4.07%	(0.043)
Cyclical Cons. Goods	2.17%	1.15%	0.57%	1.86%	(0.721)
Non-Cycl. Cons. Goods	2.10%	0.69%	-1.03%	2.84%	(0.061)
Cyclical Services	3.41%	1.32%	-2.21%	5.79%	(0.005)
Non-Cyclical Services	4.29%	1.58%	0.14%	3.37%	(0.211)
Utilities	1.84%	0.32%	-0.66%	1.53%	(0.488)
Financials	8.16%	3.58%	4.24%	2.79%	(0.581)
Information Technology	-1.50%	-1.82%	-5.78%	3.21%	(0.099)

P-values are for a two-tailed test that the two subsamples have the same mean.

Absolute Value Forecasts GDP Growth

Liew and Vassalou [2000] show in an international sample that the returns to absolute value portfolios are able to forecast GDP growth. The major insight of Merton's [1973] intertemporal capital asset pricing model (ICAPM) is that any state variable that forecasts future market returns (or more accurately the future investment opportunity set) will be a priced factor in an asset pricing model. As future market returns are a function of future GDP, Liew and Vassalou argue that the value factor is therefore a proxy for a state variable in Merton's ICAPM or (equivalently) a proxy for a priced risk factor.

We replicate their analysis for the four regions in our data set. We use Organization for Economic Cooperation and Development quarterly estimates for real GDP in the regions. We also construct a series of real world GDP, the sum of the GDP of all countries in the AWD universe in year 2000 dollar prices. Due to seasonality in the GDP data, we use as our dependent variable the growth in annual GDP between the years ending in quarters t and $t + 4$; therefore consecutive data points overlap by three quarters, which induces correlation into the errors. We correct for this in the estimation process.

The independent variables are returns to the absolute value portfolio relative to the local market over the previous 12 months, the market return over the previous 12 months, and GDP over the previous four quarters and a constant. Thus we estimate the regression:

$$GDP_{t,t+4} = \alpha + \beta^{Value} R^{Value}_{t,t-4} + \beta^{Market} R^{Market}_{t,t-4} + \gamma GDP_{t,t-4} + \varepsilon \qquad (3)$$

with a Newey-West [1987] correction for serial correlation of order 3 in the errors, and where t is in quarters (rather than in months as everywhere else).

The results are reported in Exhibit 7. The R^2 of all the regressions for the western regions are greater than 55%, and the coefficient on absolute value is negative and significant at the 5% level. Again the results are weaker for Japan. The coefficient on the market return is positive and significant. Therefore, a rising market forecasts above-average GDP growth, while a value market forecasts below-average GDP growth.

These findings are similar to Liew and Vassalou (except slightly stronger for North America), in that both the returns to the market and to absolute value are able to forecast GDP.[5] This is consistent with the interpretation that the absolute value premium is a priced factor in an ICAPM.

EXHIBIT 9
Performance of Industry Relative Value Portfolios ex Respective Global Industry Return

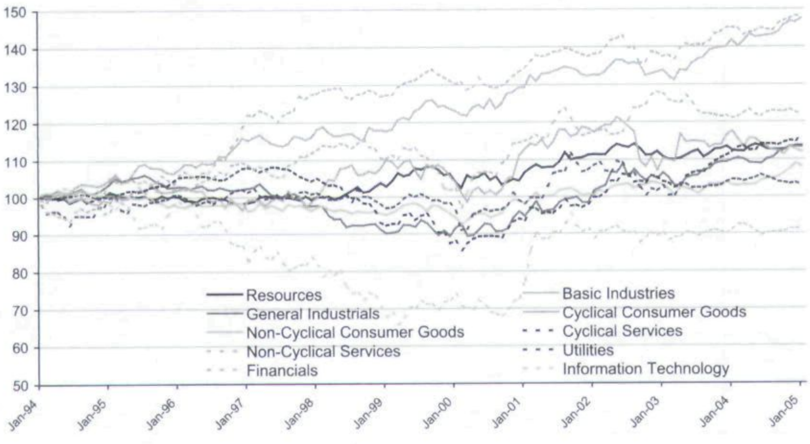

EXHIBIT 10
Annualized Volatility of and Correlation Between Returns to Industry Relative Value Portfolios in Excess of Respective Industry

	Resources	Basic Indust	General Industries	Cyclical Cons. Goods	Non-Cycl. Cons. Goods	Cyclical Services	Non-Cyclical Services	Utilities	Financials	Information Technology
Resources	**2.75%**	0.12	-0.03	-0.02	0.23	0.16	0.16	0.20	0.06	0.09
Basic Industries	0.21	**3.22%**	0.32	0.33	0.21	0.28	0.13	0.29	0.39	0.03
General Industrials	0.13	0.35	**3.91%**	0.13	0.23	0.44	0.12	0.20	0.30	0.24
Cyclical Cons. Goods	0.03	0.24	0.11	**5.79%**	0.11	0.11	0.14	0.24	0.32	0.06
Non-Cyclical Cons. Goods	0.14	0.20	0.37	0.07	**2.68%**	0.36	0.39	0.30	0.06	0.25
Cyclical Services	0.08	0.20	0.51	0.01	0.30	**3.51%**	0.29	0.21	0.20	0.30
Non-Cyclical Services	0.04	0.05	0.21	0.07	0.26	0.08	**3.94%**	0.39	0.12	0.13
Utilities	0.14	0.29	0.27	0.22	0.18	0.10	0.24	**4.98%**	0.32	0.21
Financials	0.08	0.38	0.30	0.29	0.03	0.20	0.13	0.36	**4.19%**	0.03
Information Technology	0.09	0.00	0.21	0.04	0.23	0.27	0.09	0.19	-0.01	**8.05%**

EXHIBIT 11
Implicit Industry Tilts Within Industry Relative Value Portfolios

	North America		UK		Euro Bloc		Rest of Europe		Pacific ex Japan		Japan	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
All-World Industry-Neutral	45%	(6%)	65%	(9%)	64%	(9%)	53%	(10%)	58%	(8%)	49%	(12%)
Resources	39%	(12%)	52%	(25%)	65%	(18%)	73%	(28%)	64%	(11%)	79%	(27%)
Basic Industries	36%	(11%)	80%	(12%)	70%	(13%)	59%	(15%)	72%	(12%)	51%	(17%)
General Industrials	38%	(6%)	73%	(16%)	81%	(9%)	60%	(11%)	66%	(24%)	53%	(16%)
Cyclical Consumer Goods	69%	(9%)	52%	(33%)	68%	(9%)	48%	(20%)	68%	(25%)	31%	(7%)
Non-Cyclical Cons. Goods	43%	(4%)	77%	(8%)	51%	(14%)	43%	(13%)	74%	(15%)	71%	(13%)
Cyclical Services	44%	(5%)	63%	(12%)	69%	(9%)	38%	(15%)	66%	(13%)	58%	(15%)
Non-Cyclical Services	53%	(9%)	61%	(19%)	56%	(20%)	54%	(29%)	34%	(21%)	24%	(11%)
Utilities	59%	(14%)	40%	(11%)	37%	(20%)	26%	(27%)	12%	(13%)	66%	(32%)
Financials	51%	(17%)	66%	(12%)	66%	(13%)	64%	(16%)	60%	(10%)	39%	(17%)
Information Technology	43%	(5%)	61%	(39%)	67%	(18%)	62%	(34%)	74%	(31%)	81%	(11%)

PERFORMANCE OF INDUSTRY RELATIVE VALUE PORTFOLIOS

The results look different for our industry relative value portfolios. The industry relative value premiums and spreads are reported in Exhibit 8. The premiums are positive in every industry except information technology; the market cap-weighted average premium is 1.69%, and the spread is 4.3%. These numbers are much like the country-neutral absolute value numbers.

Exhibit 8 also records average annual spreads before and after the bursting of the technology industry bubble. In all but two industries one cannot reject at a 5% level of significance that the average returns were equal over the two subperiods. This is perhaps surprising, given the extent of the tech boom, and is in sharp contrast to the results for the absolute value portfolios.

Correlation of Relative Value Portfolio Returns Across Industries

Exhibit 9 plots the performance of the industry relative value indexes over the sample (all indexes normalized to 100 at the beginning of the sample, December 1993). We can make two immediate observations. First, the graphs confirm the point in Exhibit 8 that the indexes show no inflection or only a minor inflection around the tech boom. Second, there appears to be far less correlation in the returns across industries than across regions.

This second observation is borne out by the results in Exhibit 10. As in Exhibit 3 for the regions, we see on the principal diagonal the annualized standard deviation of returns to the relative value industry portfolios in excess of their industry returns. The off-diagonal terms record the correlation coefficients between the returns to the different relative value industry portfolios. The correlation coefficients calculated over the entire data sample are in the top right-hand corner, and over the sample excluding the tech boom in the bottom left-hand corner. The mean value of the coefficients for the full period is 0.20, which is

EXHIBIT 12

Ability of Regional Rotation Portfolios to Reproduce Returns to Industry Relative Value Portfolios

	Value Premium Dec-93 to Feb 05	R^2	Constant, α (annualized)	Std. Error	β	Std. Error
All-World Industry-Neutral	1.69%	0.23	1.32%	(0.70%)	1.07	(0.17)
Resources	1.21%	0.29	2.24%	(0.80%)	1.04	(0.14)
Basic Industries	3.68%	0.43	2.09%	(0.78%)	0.84	(0.08)
General Industrials	0.96%	0.39	1.05%	(1.02%)	1.12	(0.12)
Cyclical Consumer Goods	1.15%	0.66	0.58%	(1.08%)	1.16	(0.07)
Non-Cyclical Cons. Goods	0.69%	0.28	0.93%	(0.75%)	1.14	(0.16)
Cyclical Services	1.32%	0.25	1.52%	(1.03%)	1.42	(0.22)
Non-Cyclical Services	1.58%	0.43	1.03%	(1.10%)	1.44	(0.14)
Utilities	0.32%	0.44	-0.03%	(1.21%)	1.07	(0.11)
Financials	3.58%	0.73	1.43%	(0.66%)	0.97	(0.05)
Information Technology	-1.82%	0.25	0.01%	(2.10%)	1.57	(0.24)

EXHIBIT 13

Ability of Industry Not-Growth Indexes to Reproduce Returns to Industry Relative Value Indexes

	R^2	β	Std. Err.	Constant, α (annualized)	Std. Err.	p-value
All-World Industry-Neutral	0.06	0.25	(0.08)	2.09%	(0.76%)	0.006
Resources	0.00	0.05	(0.10)	1.27%	(0.95%)	0.184
Basic Industries	0.00	-0.03	(0.09)	3.47%	(1.03%)	0.001
General Industrials	0.29	0.54	(0.07)	1.87%	(1.11%)	0.094
Cyclical Consumer Goods	0.25	-0.59	(0.09)	0.16%	(1.60%)	0.922
Non-Cyclical Cons. Goods	0.33	0.54	(0.07)	1.42%	(0.73%)	0.053
Cyclical Services	0.46	0.63	(0.06)	2.35%	(0.87%)	0.008
Non-Cyclical Services	0.08	0.29	(0.08)	2.74%	(1.42%)	0.056
Utilities	0.05	0.25	(0.09)	0.60%	(1.57%)	0.705
Financials	0.25	-0.49	(0.07)	2.99%	(1.07%)	0.006
Information Technology	0.60	0.82	(0.06)	-0.42%	(1.53%)	0.782

P-value refers to the probability of accepting the hypothesis that the constant is equal to zero.

lower than the comparable statistic of 0.33 for the region-neutral premiums recorded.

Note that the industry relative value premiums (with a median value of 3.93%) are markedly less volatile than the regionally absolute value premiums (with a median value of 5.19%). Or, equivalently, the global (industry-neutral) premium is 2.75% relative to the 4.97% volatility of the global (region-neutral) premium. These results suggest that the gains from diversifying across value-tilted industry portfolios are likely to be larger and more stable than the gains from diversifying across value-tilted regional portfolios.

Can the Performance of Relative Value Be Explained by Implicit Regional Positions?

We have shown that a significant proportion of the returns of the absolute value indexes could be explained by the implicit industry rotation strategy within the portfolios. We explore the corresponding proposition for our relative value indexes: that their performance can be explained by an implicit regional rotation strategy.

Exhibit 11 is the analogue of Exhibit 4 for relative value. It records for the universe and each industry separately the percentage of stocks in any region classified as value (the standard deviations are in parentheses). Thus an average of 45% by market cap of the North American stocks are classified as value; this proportion varies with a standard deviation of 6%. Exhibit 11 demonstrates that there are no consistent regional tilts across all industries, although there is sometimes a specific regional tilt in an industry. These tilts, however, predominantly net out in the aggregate industry-neutral portfolio, despite a small tilt out of North America to Europe.

Are these implicit regional tilts able to account for some of the return performance of our relative value industry portfolios? Similar to before, we decompose the returns to the industry relative value portfolios into the returns due to the implicit regional rotation strategy and a residual. The returns due to the implicit regional rotation strategy are found by calculating the returns to the regional indexes in proportion to the market cap-weighting of that region in the relative value industry portfolio. The regression expresses all returns in excess of their respective global industry return:

$$R_t^{\text{Relative Value}} = \alpha + \beta R_t^{\text{Regional Rotation}} + \varepsilon_t \quad (4)$$

The results are reported in Exhibit 12. The R^2s of the regressions are markedly lower than those reported in Exhibit 5. Only 23% of the variability of the world industry-neutral premium can be explained by the regional tilts that are embedded in the industry-neutral value portfolios. Results for each industry premium are broadly similar, with a median R^2 of 0.43.

More important, the level of the premium remains positive and significantly different from zero (as reflected in the reported annualized α value of 1.32%); this result holds also for the resources, basic industries, and financials (as reflected in their annalized alphas of 2.24%, 2.09%, and 1.43%, respectively).

The results suggest that a regional or country rotation cannot explain the time variation in relative value premiums. Further, relative value premiums remain broadly significant in a number of industries, even after accounting for any rotation in regional positions.

Evidence that Returns to Relative Value are not Related to Fundamentals

In the majority of industries, there appears to be only a very weak relationship between the returns to relative value and the returns to not-growth. We show this by regressing the returns to the not-growth portfolios on the returns to the industry relative value:

$$R_t^{Value} = \alpha + \beta R_t^{NotGrowth} + \varepsilon_t \quad (5)$$

Exhibit 13 records the results. Part of the variation in the world industry-neutral value premium can be explained by the not-growth portfolio, as the beta coefficient is significantly different from zero, although the explanatory power of the regression is low, as reflected in the low R^2 of 0.06 (compared to that for the world region-neutral premium regression of 0.80 reported in Exhibit 6). The level of the premium cannot be explained by not growth, as reflected in the constant term, which is significantly different from zero (again contrary to the results in Exhibit 6 for the region-neutral premium).

The results for each sector-neutral premium are broadly similar. The R^2s of the regressions are low (with a median value of 0.25), and several of the constant terms remain positive and significantly different from zero, even after accounting for variation in not growth (most notably, basic industries, general industrials, non-cyclical consumer goods, cyclical services, non-cyclical services, and financials).

R^2s are higher for four industries, information technology, non-cyclical consumer goods, general industries, and cyclical services. Yet in three of these four, the constant is still significant at the 10% level. This suggests that even though the industry not-growth portfolios are successful at explaining the variance of the relative value portfolios, they are less successful at explaining the premiums.

In the final examination here, we investigate whether the returns to the industry-neutral value portfolio can forecast GDP. We estimate the regression:

$$\begin{aligned} GDP_{t,t+4} = {} & \alpha + \beta^{Absolute\ Value} R_{t,t-4}^{Absolute\ Value} \\ & + \beta^{Relative\ Value} R_{t,t-4}^{Relative\ Value} + \beta^{Market} R_{t,t-4}^{Market} \\ & + \gamma GDP_{t,t-4} + \varepsilon \end{aligned} \quad (6)$$

where $GDP_{t,t+4}$ is real world GDP growth over the forthcoming year, $R_{t,t-4}^{Absolute\ Value}$, $R_{t,t-4}^{Relative\ Value}$, and $R_{t,t-4}^{Market}$ are the returns to our region-neutral, industry-neutral, and All World Market Index over the previous year, and $GDP_{t,t-4}$ is lagged world GDP growth. Again we use the Newey-

EXHIBIT 14

Ability of Regional Absolute Value Indexes to Forecast Future GDP Growth

	All World Developed	All World Developed	All World Developed
R^2	0.75	0.69	0.75
Intercept$_{(t-4, t)}$: α	2.60%	2.66%	2.58%
	(0.22%)	(0.24%)	(0.27%)
Return to Absolute Value $_{(t-4, t)}$: $\beta^{Abs\ Value}$	-0.041		-0.050
	(0.012)		(0.024)
Return to Relative Value $_{(t-4, t)}$: $\beta^{Rel\ Value}$		-0.027	0.019
		(0.026)	(0.048)
Market Return$_{(t-4, t)}$: β^{Market}	0.027	0.038	0.026
	(0.007)	(0.006)	(0.007)
Lagged GDP Growth$_{(t-4, t)}$: γ	-0.12	-0.149	-0.117
	(0.09)	(0.09)	(0.091)

Standard errors are corrected for hetereoscedascity and serial correlation for up to three lags using the Newey-West [1987] estimator.

EXHIBIT 15

Average Return, Volatility, and Information Ratios of Returns

	Value Premium	Volatility	Information Ratio
Region-Neutral	1.46%	4.97%	0.29
Industry-Neutral	1.69%	2.75%	0.61

West [1987] correction for serial correlation of order 3 in the errors. The results are reported in Exhibit 14.

The first column records our earlier result that the returns to our region-neutral value portfolio forecast world GDP growth. In the second column, we show the regression result when we replace the return to the region-neutral value portfolio by the returns to our industry-neutral value portfolio. The coefficient on the industry-neutral value returns has the same negative sign, but now it is not significant at standard confidence levels.

In the third column, we include both sets of returns in our regression. Now the coefficient on the industry-neutral value returns is slightly positive.

The obvious interpretation of these results is that a proportion of the information about future world GDP growth included in the region-neutral value returns is also included in the industry-neutral. Yet it is no longer a significant proportion, and is entirely dominated by the information in the region-neutral value returns.

IMPLICATIONS FOR PORTFOLIO MANAGEMENT

We shall now try to draw all the evidence together and consider the implications for portfolio management. Our principal findings are that over our sample period:

1. The average regional and industry value premiums are about the same (1.5% and 1.7%). Yet industry value premiums are less volatile than regional value premiums, and further correlations of the value premiums are lower across industries than across regions. This implies that the information ratios of an industry-neutral value strategy are higher than those of a region-neutral value strategy. Exhibit 15 summarizes this finding.
2. Returns to a region-neutral value portfolio can be replicated in large part by a levered industry rotation strategy. As industry portfolio returns are cyclical, this implies returns to regional value are cyclical. Industry-neutral value premiums, however, cannot be replicated via regional rotation strategies. This finding is consistent with the additional evidence that region-neutral value premiums can forecast GDP growth, while industry-neutral value premiums cannot.
3. At a regional level, returns to a value strategy appear highly correlated with the returns to a not-growth strategy. This is in marked contrast to value at an industry level, where returns to value are only weakly correlated with those to not growth.

We thus find strong evidence that a region-neutral value strategy exposes an investor to some systematic cyclical risk factor, which is correlated with growth and which can be explained via a sector rotation strategy. This risk will be difficult to hedge as, most notably, there are no liquid global sector futures. This stands in contrast to an industry-neutral strategy, which does not appear to be related to cyclical risk factors and that does not appear to be closely associated with economic growth. As both strategies offer similar returns, this would suggest that the industry-neutral strategy offers a better reward to each unit of systematic risk that the investor is willing to bear.

Although our results apply to a passive value-tilted global investment strategy, they may also be used to provide normative guidelines for an active investment strategy. In particular, we believe the results suggest strategies as follows:

1. Optimize global sector allocations. To the extent managers have skill in predicting global sector returns, they may choose to depart from a global industry-neutral strategy.
2. Within global industries, select securities on the basis of relative valuations to capture the value premium. Valuation metrics may also be combined with other indicators of performance, such as past price performance, to capture other market anomalies.
3. To the extent that the chosen portfolio exposures reflect unintended regional tilts, hedge these exposures with country futures.

Our research has presented evidence suggesting that a global exposure to value is best achieved on a sector-neutral basis, as this offers a better risk-reward trade-off than a region-neutral value-tilted investment. Several asset managers have restructured their investment processes to capture the premium from this investment style. The investment community ought to consider designing benchmarks that explicitly reflect this alternative approach to portfolio construction.

APPENDIX

Construction of the Value Indexes

Our stock universe includes all constituents of the FTSE All-World Developed Market Index (formerly the FTSE World) over December 1993-January 2005. The FTSE stock membership rule is based entirely on a company market capitalization criterion that differs slightly by region. The data, which include shares, free float, prices and corporate actions, countries of incorporation, and industry classification, are the data used for construction of the FTSE All-World Index.

We assign every stock to one of six independent regional markets according to country of domicile: North America (the U.S. and Canada); the U.K.; the 12 euro countries as of January 2005; the rest of Europe (Switzerland, Denmark, Norway, and Sweden); the Pacific ex-Japan (Australia, Hong Kong, New Zealand, and Singapore); and Japan. All stocks, at any time, belong to one of the 39 FTSE sectors in the 10 FTSE industries.

The regional or industry value indexes are constructed by dividing the groups of stocks into value and *not value* segments. This is done by assigning each stock in the group a style weight between 0 and 1 (where 1 signifies that the stock is entirely assigned to the value portfolio and 0 to the not value portfolio). This style weight is constructed on the basis of fundamental and consensus data sourced from Worldscope and IBES.

To construct the regional absolute value indexes, the style weights are recalculated semiannually in June and December on the basis of data recorded as of the end of May and November. There are minor reviews for new and deleted constituents in March and September. For each stock four fundamental-to-price ratios are calculated: 1) book to price; 2) sales to price; 3) dividend yield; and 4) cash flow to price. Following the FTSE methodology, each raw ratio is first truncated to remove extreme values using the published FTSE limits. Then each ratio is demeaned and scaled by the cross-sectional standard deviation of that ratio; any ratio outside +/− 3 standard deviations is assigned a value of +/− 3. Any stock with a missing ratio is given a value equal to the average for the stocks in its sector and country. Finally, the ratio is linearly transformed so as to lie between 0 and 1. The final overall style ratio (OSR) for each stock is the average of its four scaled ratios.

The stock style weights are then assigned by country, except for the euro zone, which is treated as one country. This ensures country neutrality. Within each country, stocks are ordered by their overall style ratio. Then the lowest 35% by free-float market cap are given a weight of 0, the next 10% a weight of 0.25, the following 10% a weight of 0.5, the next 10% a weight of 0.75, and the final 35% a weight of 1. Any stock spanning bands is assigned a weight in proportion to its weights in each of the bands.

All the absolute value indexes by region can be calculated using the same procedure, except the free-float market cap weight is premultiplied by the style weight. This procedure ensures that 50% of the market by free-float market cap is assigned to each regional absolute value index.

This has two immediate consequences. First, at the level of the global universe, the All-World value index is country-neutral. Second, the return to any not value regional index can be calculated as the return to the particular regional index minus the return to the regional value index. All indexes are calculated using total returns, where dividend payments are smoothed over the 12 months following announcement.

The industry relative value indexes are calculated in a similar way. The style weights are based on the same style ranking, but now stocks are assigned a weight by ranking in the FTSE sectors rather than by a ranking on a country. This ensures that in every sector 50% of stocks, by free-float market cap, are assigned a value weight and 50% a not value weight. Hence over the whole universe, the value index is now sector-neutral.

The growth and not growth indexes divide stocks on the basis of historic and expected future growth rates in earnings rather than on fundamental-to-price ratios, but the basic methodology is identical. The five measures of earnings growth are: 1) 3-year historic EPS growth; 2) 3-year historic sales growth; 3) 2-year forecast EPS growth; 4) 2-year forecast sales growth; and 5) return on equity (1− payout rate).

The data for the first two growth estimates and the final ratio come from the Worldscope database; the next two come from the IBES database. As before, any estimates outside the FTSE limits are truncated before scaling. Now the overall style ratio is made up of the average of these five scaled estimates, rather than the four ratios as previously. The calculations then proceed as for the value and not value indexes.

ENDNOTES

[1]The portfolio construction method is based very closely on the approach FTSE uses in the construction of its regional value indexes, described in detail in the appendix.

[2]The not-value portfolio is the respective universe less the value portfolio. Thus if the portfolios were rebalanced every period, the return to the not-value portfolio would be equal to the market return minus the return to the value portfolio.

[3]As a labeling convention only, we do not refer to the rest of Europe as a western region, even though it consists of the countries of Switzerland, Denmark, Norway, and Sweden. This is to simplify the various descriptions. It is the residual

group of countries, and is an outlier in most of our results.

[4]The static Gordon growth model was generalized to time-varying expected returns and growth rates by Campbell and Shiller [1988] using a log-linear approximation.

[5]The sign of the coefficient, β^{Value}, is negative in our regression but positive in the Liew and Vassalou results. In order to understand these results, we repeated the experiment on a global data set that is available over a longer time period. On this data set, over their sample period (1980-1996) we were able to reproduce their results and over our sample period (1993-2004) ours. Therefore, the forecasting regression does appear to be period-dependent.

REFERENCES

Bourguignon, F., and M. de Jong. "Value Versus Growth: Investor Styles and Stock Characteristics." *The Journal of Portfolio Management*, Summer 2003.

Breen, W. "Low Price-Earnings Ratios and Industry Relatives." *Financial Analysts Journal*, July/August 1968.

Brooks, R., and M. Del Negro. "The Rise in Comovement Across National Stock Markets: Market Integration or IT Bubble?" *Journal of Empirical Finance*, vol. 11(5) (2004), pp. 659-680.

Campbell, J., and R. Shiller. "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors." *Review of Financial Studies*, vol. 1 (1988), pp. 195-228.

Cavaglia, S., J. Diermeier, V. Moroz, and S. De Zordo. "Investing in Global Equities." *The Journal of Portfolio Management*, vol. 31(1) (2004).

Cavaglia, S., C. Brightman, and M. Aked. "The Increasing Importance of Industry Factors." *Financial Analysts Journal*, vol. 56(5) (2000), pp. 41-54.

Cavaglia, S., and V. Moroz. "Cross-Industry, Cross-Country Allocation." *Financial Analysts Journal*, vol. 58(6) (2002), pp. 78-97.

Dreman, D., and E. Lufkin. "Do Contrarian Strategies Work Within Industries?" *Journal of Investing*, Fall 1997.

Fama, E.F., and K.R. French. "Size and book-to-market factors in earnings and returns." *Journal of Finance*, vol. 50(1) (1995), 131-155.

——. "Value versus Growth: The International Evidence". *Journal of Finance*, vol. 53(6) (1998).

Fuller, R., L. Huberts, and M. Levinson. "Returns to E/P Strategies, Higgledy-Piggledy Growth, Analysts' Forecast Errors, and Omitted Risk Factors." *Journal of Portfolio Management*, Winter, (1993), pp. 13-24.

Liew, J. and M. Vassalou. "Can book-to-market, size and momentum be risk factors that predict economic growth?" *Journal of Financial Economics*, Vol. 57 (2000), pp. 221-245.

Merton, Robert C. "An Intertemporal Capital Asset Pricing Model." *Econometrica*, vol. 41(5), September 1973.

Newey, W., and K.D. West. "A Simple, Positive, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica*, vol. 55 (1987), pp. 703-705.

Sinquefield, R. "Where are the Gains from International Diversification?" *Financial Analysts Journal*, vol. 52(1) (1996), pp. 8-14.