by Robert D. Arnott and Roy D. Henriksson

A Disciplined Approach to Global Asset Allocation

One common misperception about global markets is that there is something fundamentally "wrong" with one market trading at several times the price/earnings multiple of another. But there is nothing in equilibrium theory to suggest that P/E differences between markets represent investment opportunities.

The appropriate strategy for exploring global asset allocation is not to compare the valuation in one country directly with the valuation in another. Rather, one should compare the earnings yield in one country with the cash or bond yield in the same country, thereby arriving at a measure of the equity risk premium in that country. Deviations from the "normal" equity risk premiums can then be compared across country boundaries.

As economic and political risks differ across countries, so should equity risk premiums. Changes in the relative risk premium between two equity markets can, however, provide a measure of changes in relative valuation and, potentially, of changes in the relative attractiveness of the two markets. This suggests a framework for global asset allocation that allows for comparisons both within and between countries. In essence, such a framework would enable one to compare Japanese stocks with German bonds or with U.S. cash.

OBJECTIVE MEASURES of prospective market "returns" can provide valuable guidance for asset allocation by revealing the relative market outlook for various asset classes. Much of this information is provided by the market. We know the yield for cash equivalents; we know the yield to maturity for bonds; and we can estimate the approximate earnings yield or dividend discount model return for equities. These measures have been used with great success to profit from the relative performance of stocks, bonds and cash in the United States.[1] The use of a disciplined approach for including other information, such as the recent inflation rate and economic experience, may provide additional insight.

1. Footnotes appear at end of article.

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Does a disciplined approach to active asset allocation lend itself to export? Can the methods developed for the allocation of assets in the U.S. be applied in overseas markets? The answer to both these questions is yes. Our preliminary empirical results suggest that the same tools that have proved so profitable in the U.S. may also have value in the international arena. If a global strategy for asset allocation is difficult, it is only because the most profitable strategy is to focus on the least comfortable asset class.

Fundamentals in Asset Allocation

Pricing in any market aggregates the judgments of all the participants in that market. Basing a measure of future asset class returns on current indications of relative opportunity capitalizes on this information. The assumption underlying such a model is that financial markets demand differential return premiums for different asset classes.

The sophisticated investor faces a critical and ongoing asset allocation question: In the prevailing market environment, which assets merit

emphasis? The natural tendency is to choose the comfortable answer, the answer that minimizes anxiety. However, the comfortable answer is rarely the profitable answer. How many managers were aggressively cutting equity holdings in early 1973 or mid-1987? How many managers were doing the opposite in late 1974 or mid-1982?

A disciplined approach to asset allocation may provide a basis for confidently resisting the comfortable consensus when pursuit of a contrarian strategy would be most rewarding. One such approach in essence involves letting the market provide measures of future returns. The asset allocation decision is based primarily on the relative attractiveness of returns from various asset classes and will change only as their relative return prospects change.

Unlocking Market Outlook

This disciplined approach to asset allocation rests on four assumptions.

- Prospective long-term returns for various asset classes can be estimated. We know the yield on cash; we know the yield to maturity on long bonds; and the capital markets provide some crude but objective measures of long-term return prospects in equities in the form of earnings yields, dividend yields or consensus-based dividend discount models.
- These returns are based on current market prices. They reflect the view of all market participants regarding the relative attractiveness of asset classes. If calculated equity returns are high relative to bond returns, for example, the market is implicitly demanding a substantial equity risk premium, which suggests that investors are uneasy about equities.
- These relative returns tend to exhibit a normal or "equilibrium" level.
- When prospective future returns, as measured against investment alternatives, stray from this normal equilibrium, market forces pull them back into line, creating an asset allocation profit mechanism.

Even if we disregard the third and fourth assumptions, and assume no equilibrating mechanism in the markets, an objective approach to asset allocation can still work. If the objective measure of long-term equity return prospects rises relative to other asset classes by 100 basis points, then the investor will expect to earn 100 basis points of excess return over the long run, even if there is no tendency to move back towards an equilibrium condition.

Nonetheless, the equilibrating mechanism is the source of the impressive profits achieved in recent years by active asset allocation disciplines. Suppose, for example, that the equity risk premium is 100 basis points too high relative to long bonds. Then either long bond yields should rise by 100 basis points or stock earnings yields should fall by 100 basis points to restore the equilibrium relationship. This would imply a price move in either stocks or bonds that amounts to many times the 100-basis-point disequilibrium (because it would take a *price* move far larger than 100 basis points to shift either the earnings yield or the bond yield by a full 100 basis points). In other words, an equilibrating mechanism is not essential to the success of active asset allocation, but it is a key mechanism for providing the considerable profits an active asset allocation process is capable of delivering.

Why Do Conventional Global Comparisons Fail?

One of the most common global allocation errors stems from the assumption that equity value measures (such as dividend yields or price/earnings ratios) can be directly compared across global boundaries. No one makes such assumptions about bonds or cash. The reasons why such comparisons fail in the bond markets may tell us something about the error in assuming comparability of equity valuation measures.

Bond yield differences are explained by equilibrium theory in the context of long-term inflation rates and currency shifts. Ten-year government bonds in one country may offer a yield of 10 per cent, while the corresponding yield in another country is 5 per cent. This makes perfect sense, *if* the currency in the high-yield country erodes by 5 per cent per year vis-à-vis the currency in the low-yield country. Such a differential would result in a 40 per cent currency depreciation over the course of a decade. Currency moves of this magnitude over a decade are so commonplace as to be routine. In other words, no serious economist would suggest that international interest rate differences run contrary to equilibrium theory.

The same holds true for dividend discount model rates of return. A dividend discount model rate of return of 15 per cent for one

country and 10 per cent for another can be fully justified in the face of a long-term *expectation* of 5 per cent annual currency divergence. The investor in the low-return country, seeking to capture the superior performance offered by the high-return country, would forfeit the performance differential through currency depreciation. If the investor were to seek protection against this currency erosion by hedging in the foreign exchange markets, the foreign exchange forward markets would similarly be priced to take away the rate of return differential.

P/E Ratio Differences

Price/earnings ratios have historically tended to be closely correlated with dividend discount model rates of return. So the above argument can be readily applied to P/E comparisons. If $100 buys $5 per year of earnings in one country and $10 per year of earnings in another, nothing in equilibrium theory suggests that this P/E difference should be inappropriate. Suppose the high-P/E country exhibits currency appreciation vis-à-vis the low-P/E country. Then the book value, the sales and the currency-adjusted earnings of the companies in the low-P/E country would all diminish when measured in the currency of the high-P/E country.

In short, the common argument that countries with low P/E ratios, low price-to-cash-flow ratios or low price-to-book-value ratios are inherently more attractive investment opportunities than their high-multiple counterparts is theoretically flawed. No such argument can be made consistent with equilibrium theory.

In looking at P/E ratios, factors other than currency risk cloud the picture when one country is compared with another.

- Accounting principles differ across countries.
- Growth opportunities differ across countries.
- Different countries face different economic risks.
- Differences in political environments will influence investors' perceptions of future cash flows.

All these considerations, and other lesser considerations, could justify large differences in earnings yields, *even in the absence of currency considerations.*

Comparing Equity Markets

We can observe empirically that low-multiple countries have a slight tendency to offer higher return prospects than high-multiple countries. This may be expected even if there is not a corresponding difference in interest rates.

Suppose two countries have the same interest rates, but different P/E ratios. Under this circumstance, any currency-based justification for the relative P/E ratios could be readily arbitraged in the currency markets. With no difference in interest rates, currency futures would be priced at or near current exchange rates. In this example, any difference in P/E multiples would have to be explained in the context of either greater growth prospects or higher risks for one country versus the other. Differences in equilibrium expected returns, in the absence of market barriers, should result from differences in risks.

Because P/E ratios *should* differ across countries, the best way to compare equity markets in different countries is first to measure the equity risk premium in each country, then to compare equity risk premiums across countries. Even here, we encounter a potential pitfall. Because different growth rates, accounting standards or political/economic climates can justify different P/E ratios, equity risk premiums cannot be compared directly with one another. The *equilibrium* relation between earnings yield and bond or cash yield (hence the normal equity risk premium) in one country may be higher or lower than that in another country.

This leads to the final step in the comparative analysis: If we measure the equity risk premium in any particular country, and compare that equity risk premium with the "normal" equity risk premium for that country, we can then measure the *abnormal equity risk premium.* This abnormal equity risk premium indicates the extent to which an equity market offers rewards in excess of (or below) its normal reward opportunities. In essence, this tells us how far the markets *within* a country have strayed from equilibrium. These abnormal risk premiums, which measure disequilibriums within a country, *can* be directly compared across country boundaries.

Asset Allocation versus Currency Selection

The framework outlined above makes no naive assumptions about normal relationships between different countries' P/E ratios. It makes

Table I Total Returns of International Equities*

	1-Year		3-Year		5-Year		10-Year	
	Unhedged	*Hedged*	*Unhedged*	*Hedged*	*Unhedged*	*Hedged*	*Unhedged*	*Hedged*
France	32.9	13.5	51.9	33.3	40.6	33.4	24.4	20.3
Germany	16.6	(1.1)	46.5	30.7	35.4	31.4	18.3	19.2
Italy	22.4	NA	68.3	NA	43.0	NA	27.6	NA
Japan	76.3	59.5	64.2	42.7	48.6	36.5	29.2	24.9
U.K.	52.4	40.5	46.2	34.8	32.6	32.9	24.3	23.4
U.S.	23.8	23.8	30.3	30.3	27.2	27.2	16.2	16.2
World	43.4	35.0	42.2	34.0	34.1	31.1	20.5	19.9

*All periods end 6/87; data from Frank Russell International.

no assumptions that are inconsistent with equilibrium theory. Furthermore, and importantly, it *disaggregates the currency forecast from the asset class forecast*. In so doing, it presents the investor with an array of fully hedged investment alternatives. Its forecasts are consistent with the currency expectations implicit in the markets and can be supplemented with independent forecasts of currency returns.

The disaggregation of asset class expectations and currency expectations is important because it achieves two often contradictory objectives: It broadens the set of investment alternatives while simplifying the discipline for evaluating those alternatives. If asset class decisions are made based on fully hedged (local-currency) return expectations, we wind up with a model that yields approximate equivalency between cash equivalents around the globe, because the forward markets are largely driven by this arbitrage. Figure A illustrates this graphically.

This structure leads to direct comparability of the asset classes and to variance/covariance measures that are independent of the "home currency." The currency decision can then be made separately, based on whether the incremental return associated with an attractive currency would justify the incremental risk associated with lifting the hedge.

Hedging vs. Not Hedging

This view of the capital markets very clearly suggests that the currency decision and the asset allocation decision can and should be made independently. It is worth asking whether history supports this view. Tables I and II summarize the historical returns and volatilities of international equities. We should note that historical returns tend to be poor indicators of future returns; historical volatility does better, but is still imprecise as an indicator of future volatility. The individual numbers are thus not very meaningful, but the general pattern of the results is.

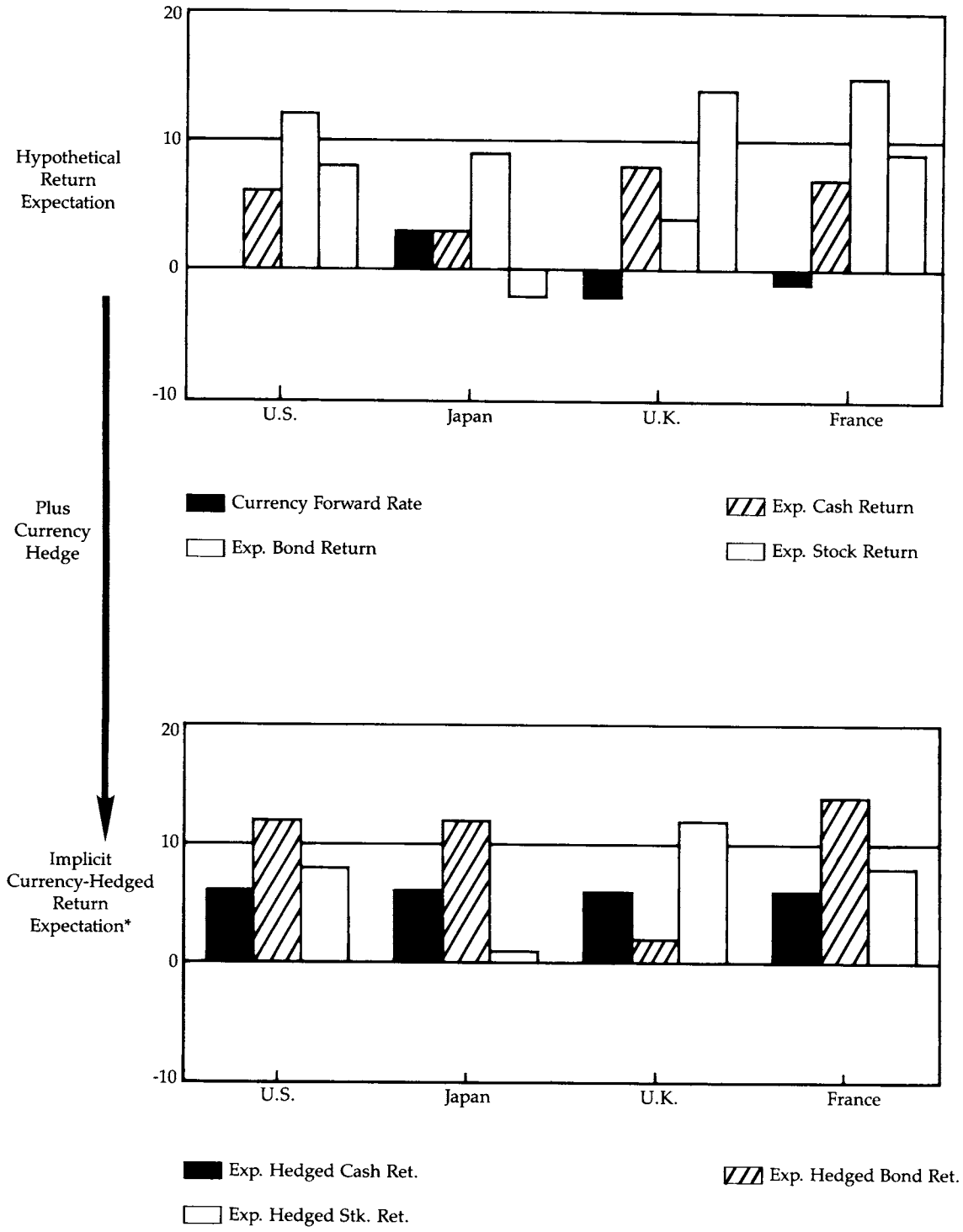
Clearly, over the three years ended June 1987, a hedged strategy sharply impaired the performance of a global portfolio. The reason is clear: The dollar fell relative to other world currencies far more than the forward rates used for hedging would have suggested. The results over a longer horizon are somewhat more encouraging. It would seem that the dollar out-

Table II Volatility of International Equities*

	3-Year		5-Year		10-Year	
	Unhedged	*Hedged*	*Unhedged*	*Hedged*	*Unhedged*	*Hedged*
France	30.2	24.8	24.9	20.6	28.1	21.9
Germany	24.9	20.5	22.7	18.2	21.7	15.7
Italy	41.4	35.7	37.8	32.6	36.4	33.4
Japan	23.9	15.3	26.5	16.2	24.2	15.0
U.K.	21.0	15.8	20.8	15.0	21.7	16.4
U.S.	15.6	15.6	15.3	15.3	14.8	14.8
World	13.2	10.9	13.9	11.3	14.7	11.8

*All periods end 6/87; data from Frank Russell International.

Figure A Effects of Hedging



*Note parity in hedged cash returns.

paced forward rate expectations early in the past decade by nearly as much as it underperformed in the past three years.

Without a hedge, the U.S. market is less volatile than any other market around the world. But the correlations between the world markets are low enough that the volatility of the world market, even on an unhedged basis, is slightly below that of the U.S., whether we are looking at a three-year, five-year or 10-year span. By hedging, we expose ourselves only to the volatility of each market in local-currency terms; we do not subject ourselves to the coupling of market and currency risk. The hedged results are striking: Over any historical time span, most individual world markets (with the exception of Italy) exhibited only slightly more volatility than the U.S. market.

Because world markets are not highly correlated, the hedged world portfolio consistently exhibited some 20 per cent less volatility than the unhedged world portfolio. When compared with a simple U.S. equity investment, the hedged world portfolio was 20 to 30 per cent less volatile. This holds true even though the U.S. market represented a large portion (35 to 60 per cent) of the world market!

The Cost of Not Hedging

Table III gives some indication of the cost of risk. Suppose we believed that all world markets offered an expected return of 12 per cent. Then an investment solely in the U.S. market, with an average volatility of 15 per cent, might be expected to deliver 10.9 per cent on a compound geometric return basis. (If we assumed a higher standard deviation in the wake of October 1987, the cost of volatility would of course be even greater.) Use of a global hedged portfolio could reduce that risk by 20 per cent, so that the geometric return rises by 40 basis points, to 11.3 per cent.

This increase in return does not rely on any assumptions regarding active management or the ability to select countries or markets, but simply on currency hedging. Currency hedging on the forward markets is very inexpensive; its very real rewards far outweigh its cost. Furthermore, if the asset allocation disciplines described in this article are effective in selecting the better performing world markets, then the rewards of hedged international investing can be greater still.

We would not advocate automatic use of a currency hedge. If an investor believes that a certain foreign currency will perform much better than its forward rates, then a hedge is not necessarily desirable. In the absence of a confident view of foreign currency strength, however, a currency hedge not only reduces the risk of global investing significantly, but in so doing actually improves long-term returns. In fact, the appropriate "no-forecast" allocation for investors will probably be fully hedged, because the two-sided nature of the currency market makes it unlikely that the normal expected return from being unhedged is sufficiently positive to justify bearing the additional risk.

Table III The Penalty of Risk

Average Return	*Standard Deviation*	*Geometric Return*
12%	10%	11.5%
12%	12%	11.3%
12%	15%	10.9%
12%	20%	10.0%
12%	25%	8.9%

Empirical Results: Stage I

The expected return on bonds can be represented by yield to maturity, and that on cash by cash yield. Equity valuation presents a more difficult problem; ideally, equity valuation calls for a measure of the net present value of future cash flows. Among the equity valuation measures readily available for the international markets, normalized earnings yields have proved to be the most consistent indicator of stock performance.[2] In calculating total returns for equity, it is necessary to add a measure of sustainable growth; the addition of economic variables to the regressions indirectly accomplishes this.

None of these measures differs conceptually from those now widely used in similar models in the United States. In general, remarkably few changes are required to adjust the model for use in other countries.

At this stage, we make the assumption that objective measures of *prospective* relative return should be positively correlated with subsequent *actual* relative returns. Is the equity risk premium vis-à-vis bonds (stock earnings yield minus bond yield) positively correlated with subsequent stock-versus-bond relative performance?

Is the equity risk premium versus cash (stock earnings yield minus cash yield) positively correlated with the subsequent performance of stocks versus cash? Is the bond maturity premium (bond yield minus cash yield) positively correlated with subsequent bond-versus-cash relative performance? If so, then a "Stage I" asset allocation model will work.

In all the tests, monthly observations were used and the predictive variables were sufficiently lagged to ensure that the inputs were actually available prior to the period over which the corresponding realized returns were measured. While the results should be viewed as preliminary, given the length of the time periods used in the tests, the results are encouraging in that they support the results from actual money under management in the United States.[3]

Market-Implicit Rates of Return

Tables IV, V and VI show the univariate regression coefficients for Stage I asset allocation for 15 different countries. In each instance, we are testing the relation between objective measures of the prospective return difference between any two asset classes and the subsequent realized return differences over a one-month horizon.

It may be helpful to focus on a single country. In Table IV, the equity risk premium is measured vis-à-vis bonds. This gives us an objective measure of the relative attractiveness of stocks and bonds, which is regressed against the subsequent excess return of stocks over bonds. The result for Japan is a coefficient of 1.39. Thus every 100-basis-point difference between the Japanese stock market earnings yield and the Japanese 10-year bond yield translates into an average 139-basis-point difference in the relative performance of stocks versus bonds over the subsequent month.

Table V Stock Earnings Yield Minus Cash Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.30	−0.32	−0.03
Austria	0.25	0.42	0.16*
Belgium	0.11	0.18*	0.07*
Canada	0.17	0.22	0.05
Denmark	0.03	0.01	−0.03
France	0.45*	0.95**	0.40**
Germany	0.27	0.35*	0.08
Italy	0.12	0.32	0.20**
Japan	1.77	1.64	−0.13
Netherlands	0.60**	0.61**	0.01
Spain	0.68	0.72	0.04
Sweden	0.43	0.24	−0.18
Switzerland	0.16	0.28	0.12**
U.K.	0.34	0.14	−0.18
U.S.	0.30*	0.37**	0.07
Average	0.36**	0.41**	0.04

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Table IV Stock Earnings Yield Minus Bond Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.23	−0.76	−0.53
Austria	1.09	0.98	−0.11
Belgium	0.24	0.19	−0.05
Canada	0.33	0.28	−0.05
Denmark	0.05	−0.18	−0.23*
France	0.16	−0.05	−0.21**
Germany	0.46	0.29	−0.16
Italy	0.04	−0.05	−0.10**
Japan	1.39	1.36	−0.03
Netherlands	1.64**	0.97**	−0.67*
Spain	2.90**	2.79**	−0.11
Sweden	0.79	0.44	−0.34
Switzerland	0.86*	0.88*	0.02
U.K.	1.36**	0.80	−0.54
U.S.	0.36	0.10	−0.26
Average	0.76**	0.54	−0.22**

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Table VI Bond Yield Minus Cash Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.47	−0.44	0.03
Austria	0.08	0.43	0.36**
Belgium	0.12	0.23*	0.12**
Canada	−0.02	0.25	0.28*
Denmark	−0.16	0.24	−0.26*
France	0.20	0.54**	0.34**
Germany	0.19	0.42*	0.22**
Italy	0.04	0.28*	0.24**
Japan	0.72	−0.8*	−0.09
Netherlands	0.26	0.53**	0.27
Spain	−0.48	−0.34	0.14
Sweden	−0.01	0.00	0.01
Switzerland	−0.02	0.14	0.16**
U.K.	−0.04	−0.12	−0.06
U.S.	0.22*	0.52**	0.30*
Average	−0.05	0.12	0.17**

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

This might seem counterintuitive on the surface. How can a 100-basis-point difference in yields translate into *more than* 100 basis points in subsequent one-month performance? The answer is found in the leverage inherent in the capital markets. Suppose that the average earnings yield in Japan during the period covered by this test was 4 per cent and the average 10-year bond yield 8 per cent. A 100-basis-point rally in stocks would depress the earnings yield by only four basis points (from 4.00 to 3.96 per cent). A 100-basis-point rise in the bonds would depress bond yields by only about 12 basis points (from 8.00 to about 7.88 per cent). In other words, a 139-basis-point relative performance difference in a single month, stemming from a 100-basis-point stock-bond disequilibrium, could result from either a 5.6-basis-point change in stock earnings yield or a 16.7-basis-point change in bond yields.

The striking finding in Table IV is that disequilibrium in the measure of stock earnings yield versus bond yield works as a predictor of stock-bond relative returns in 14 of the 15 countries tested (four of them with statistical significance). The link between the stock-bond disequilibrium measure and subsequent stock-bond relative performance is a strong one: On average, every 100 basis points of measured disequilibrium translates into 76 basis points of subsequent one-month relative performance. The variable is also powerful in suggesting future bond behavior: In 14 of the 15 countries tested, an abnormally high equity risk premium is associated with adverse bond market performance in the subsequent month.

Table V suggests that the equity-versus-cash risk premium (stock earnings yield minus cash yield) is a good indicator of stock excess returns vis-à-vis cash in 14 of the 15 countries tested. The stock-cash risk premium is also indicative of stock-versus-bond relative performance in 14 of the 15 of the countries tested.

Finally, Table VI suggests that the slope of the bond market yield curve is a powerful indicator of subsequent bond performance relative to cash. If the yield curve is unusually steep (bond yields high relative to cash yields), fixed income returns are likely to do well in the future. This relationship is statistically significant in over half the countries tested. We also find that a steep yield curve bodes well for stock market excess returns, as measured against cash.

The implications of these three tests are relatively straightforward: Market-implicit rates of return matter. A high equity risk premium suggests investor aversion to equities; investors with the courage to bear equity risk will be rewarded. A high bond market maturity premium suggests investor aversion to interest rate risk; the investor willing to bear that risk will reap rewards.

A Changing Equilibrium: Stage II

The previous results depend on an investment framework in which the equilibrium risk-return tradeoff remains stationary. Recent studies of capital market behavior suggest that equilibrium relationships between asset classes can change.[4] The obvious question is whether it makes sense to explore a structure in which disequilibrium measures are based on recent equilibriums.

Tables VII, VIII and IX are based on a short-term definition of equilibrium. In these tables, instead of comparing objective risk premiums with a long-term definition of the equilibrium relationships, we compare risk premiums with their most recent 24-month averages. The risk premium at the beginning of January 1987, for example, is compared with the average stock-versus-bond risk premium (stock earnings yield minus bond yield) over the two years 1985 and 1986. Any difference is viewed as a disequilibri-

Table VII 24-Month Trend in Stock Earnings Yield Minus Bond Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.48	−0.70	−0.22
Austria	0.11	0.24	0.13
Belgium	0.36	0.28	−0.09
Canada	0.44	0.75*	0.31*
Denmark	0.08	0.13	0.05
France	1.18*	1.57**	0.38*
Germany	0.66	0.92*	0.26
Italy	0.14	0.47	0.33**
Japan	4.16*	3.16	−0.16
Netherlands	1.32**	1.00**	−0.23
Spain	2.58**	2.42*	0.16
Sweden	1.00	0.78	−0.23
Switzerland	0.96	1.39*	0.43**
U.K.	1.22*	0.82	−0.34
U.S.	0.49	0.84**	0.35
Average	0.95**	0.94**	−0.01

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Table VIII 24-Month Trend in Stock Earnings Yield Minus Cash Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.26	−0.26	0.00
Austria	−0.20	0.00	0.19**
Belgium	0.08	0.14	0.05
Canada	0.11	0.30	0.20*
Denmark	0.04	0.33*	0.29*
France	1.28	1.61*	0.34**
Germany	0.32*	0.50**	0.18*
Italy	−0.04	0.18	0.22**
Japan	2.11	1.90	−0.22
Netherlands	1.55**	0.62**	0.07
Spain	3.07*	2.97*	−0.10
Sweden	0.22	0.61	−0.08
Switzerland	0.24	0.41*	0.17**
U.K.	0.16	0.06	−0.07
U.S.	0.39*	0.61**	0.22
Average	0.47*	0.60**	0.10

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Table X 24-Month Trend in Real Cash Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.21	−0.11	0.01
Austria	0.69	0.47	−0.22
Belgium	0.00	−0.03	−0.03
Canada	−0.18	−0.16	0.01
Denmark	0.08	−0.01	−0.09
France	0.03	−0.08	−0.11
Germany	−0.40*	0.54**	−0.14
Italy	−0.03	0.02	0.04
Japan	−0.76	−0.35	0.40
Netherlands	−0.42**	−0.46**	−0.04
Spain	−0.88	−0.86	0.02
Sweden	−0.29	−0.01	0.28
Switzerland	0.01	0.00	−0.01
U.K.	−0.16	0.16	0.35
U.S.	−0.50**	−0.43**	0.07
Average	−0.20	−0.16	0.04

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

um and suggests relative opportunities between stocks and bonds.

As Table VII shows, this approach actually worked better than the Stage I approach for most countries. Instead of four stock-bond relationships achieving statistical significance, five do. Also, the average coefficient comparing this short-term disequilibrium measure with the subsequent relative performance rises from 0.76 to 0.95, a 25 per cent improvement. We observe the same kind of pattern for stock-cash disequilibriums and for bond-cash disequilibriums.

Table IX 24-Month Trend in Bond Yield Minus Cash Yield

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.38	−0.34	0.05
Austria	−0.54	−0.14	0.40**
Belgium	0.01	0.10	0.08**
Canada	−0.05	0.19	0.24
Denmark	−0.02	0.24	0.26*
France	−0.04	0.28	0.32**
Germany	0.27	0.45*	0.19*
Italy	−0.12	−0.04	0.08
Japan	0.30	0.64	0.34
Netherlands	0.37	0.60**	0.23
Spain	−0.60	−0.50	0.10
Sweden	0.63	0.69	0.06
Switzerland	0.21	0.41	0.20**
U.K.	−0.10	−0.11	−0.01
U.S.	0.40*	0.60**	0.20*
Average	0.02	0.20	0.18**

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Real Interest Rates

We have observed that the trend in real interest rates, defined as Treasury-bill yields minus 12-month CPI inflation, has been a powerful factor in U.S. capital markets.[5] The results in Table X reaffirm that relationship. They suggest that a rise in real interest rates in the U.S. induces a flight of money out of stocks. Every 100-basis-point rise in real interest rates translates into a 50-basis-point one-month performance penalty for stocks versus bonds! The result is significant at a 1 per cent level.

When we broaden this research to the global arena, however, we find that the relationship is not consistent around the globe. It is significant in only three countries (but highly significant in those three)—namely, the U.S., Germany and the Netherlands. Outside of those countries, the relationship is spotty and inconsistent at best. In short, CPI inflation appears to have only limited merit in active asset allocation decisions in the global arena.

Does this mean that the U.S., German and Netherlands results are spurious, the result of luck? Or does it mean that these three countries are unique, perhaps because the investment community in each of the three countries focus-

Table XI Stock Return Variance

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.33	0.77	1.01
Belgium	0.65*	0.88**	0.23**
Canada	2.00*	2.48**	0.47
Denmark	0.14	0.60	0.46
France	−0.47	−0.84	−0.37
Germany	0.22	0.44	0.22
Italy	0.36	0.37	0.02
Japan	1.00	1.13	0.13
Netherlands	0.73	1.04	0.32
Sweden	2.40	2.88*	0.48
Switzerland	0.25	0.28	0.04
U.K.	−0.18	−0.25	−0.11
U.S.	1.27*	1.83**	0.56
Average	0.62*	0.89**	0.27**

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

es close attention on CPI inflation? Statistical tools cannot answer these questions. Relationships that are inconsistent, which do not stand up to a broader evaluation, might be viewed with skepticism. We would lean towards ignoring models, such as the trend in real yields, that exhibit only intermittent statistical significance.

The Influence of the Macroeconomy: Stage III

Capital markets do not exist in a vacuum. Asset values do not rise and fall of their own accord. Rather, they reflect the investment community's views of future macroeconomic prospects. In an investment world where the judgments of millions of investors shape market prices, it might seem reasonable to assume efficiency, to assume that the macroeconomy cannot provide useful information that is not already reflected in consensus prices. The historical evidence does not necessarily support this view.

Several macroeconomic factors appear to have significant bearing on the subsequent performance of various assets. We explored (1) stock return variance; (2) rate of change in retail sales; (3) rate of change in producer prices; (4) levels of unemployment; and (5) rate of change in unit labor costs. We tested each of these variables, using a regression analysis in which the data were appropriately lagged to reflect reporting delays (which differ from country to country). The results were surprising.

Stock return variance, measured as the volatility of stock market performance over the prior six months, has been shown to be a powerful indicator of future stock market performance in the United States.[6] Of course, higher volatility should require a higher expected return as compensation for the higher risks faced by an investor. This in itself should offer favorable opportunities for investors whose tolerance for risk is greater than that of the aggregate market. As a predictor for asset class returns, prior return volatility appears to have merit in 11 of the 13 countries tested, as Table XI shows.

Stock volatility also appears to be useful as a predictor of bond market performance. When stock volatility rose, not only did stocks subsequently perform better, but bonds did, too. It is beyond the scope of this article to delve deeply into the reasons behind this relationship, but two possibilities come to mind. It may reflect the positive correlation between bond and stock returns. Alternatively, it may arise because heightened volatility in one asset breeds general investor uncertainty, leading to a demand for superior rewards in all risky assets. Nonetheless, we should note that the bond results were not significant in any country other than Belgium.

On the surface, it might seem that the rate of change in retail sales is a useful indicator of accelerating or decelerating economic activity, hence may indicate improving or eroding equity prospects. Unfortunately, the evidence in Table XII suggests that retail sales are fully discounted

Table XII Percentage Change in Retail Sales

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	0.00	0.02	0.01
Belgium	0.02	0.02	0.00
Canada	0.14	−0.09	−0.23
Denmark	0.04	0.07	0.03
France	0.04	−0.05	−0.09
Germany	0.34*	0.37**	0.03
Italy	0.00	0.00	0.00
Japan	0.34	0.12	−0.23
Netherlands	0.02	0.05	0.03
Sweden	−0.01	−0.05	−0.03
Switzerland	0.07**	0.07*	0.00
U.K.	−0.62	−0.77*	−0.14
U.S.	0.31	−0.09	−0.39*
Average	0.05*	−0.03	−0.08

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Table XIII Percentage Change in Producer Price Index

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	0.13	0.08	−0.06
Belgium	−0.43	−0.55*	−0.12*
Canada	2.34	1.43	−0.91
Denmark	0.60	0.13	−0.47
France	−0.14	−0.34	−0.20**
Germany	−0.98	−1.91**	−0.92**
Italy	−0.02	−0.75	−0.73**
Japan	0.46	0.45	−0.01
Netherlands	−0.62	−0.87*	−0.25
Sweden	−0.90	−1.36	−0.46
Switzerland	−1.45**	−1.81**	−0.35**
U.K.	0.17	−0.60	−0.78
U.S.	−0.18	−1.08**	−0.90**
Average	−0.08	−0.55	−0.47**

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

in security prices. There are six statistically significant relationships, but no consistent directional pattern. Retail sales are significantly positively related to German stock performance and significantly negatively related to British equity performance. These are not results that would earn the confidence of any sensible investor.

By contrast, the results for producer prices are remarkable in their consistency. While the results presented in Table X suggested that real yields, based on a CPI definition of inflation, are of limited value, inflation as measured in producer prices turns out to be consistently useful.

Table XIV Unemployment

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Australia	−0.96	−0.16	0.80
Belgium	0.15*	0.23**	0.08**
Canada	−0.11	−0.24	−0.13
Denmark	−0.42*	−0.07	0.36
France	0.46	0.96*	0.49*
Germany	0.26**	0.39**	0.12*
Japan	0.05	0.06	0.02
Netherlands	0.12	0.21	0.09
Switzerland	1.92	2.09	0.16
U.K.	0.02	0.23	0.22
U.S.	0.33	0.69**	0.35
Average	0.17	0.40	0.23**

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

Table XV Percentage Change in Unit Labor Costs

	Coefficient of Regression with Subsequent Asset Class Relative Performance		
	Stock-Bond	*Stock-Cash*	*Bond-Cash*
Belgium	−0.40	−0.51	−0.11
Canada	−0.08	−0.06	0.02
Denmark	0.37	−0.30	−0.67
France	−1.18	−2.03	−0.84
Germany	−0.31**	−0.30	0.01
Italy	−0.23	−0.40	−0.17*
Netherlands	−0.46	−1.16	−0.70
Sweden	0.09	−0.04	−0.13
U.K.	0.47	−0.02	−0.54
U.S.	0.06	−0.44	−0.50
Average	−0.17	−0.53**	−0.36*

*Significant at a 95% confidence level.
**Significant at a 99% confidence level.

As Table XIII shows, in *every single country* tested, an acceleration in PPI inflation translates into an erosion in bond performance relative to cash. In six of the 13 countries, the relationship is statistically significant, and in five of the 13 countries, it is significant at the 1 per cent level.

Acceleration in PPI inflation also has a bearing on stock market performance. Here we find a relatively consistent pattern in which accelerating PPI inflation depresses subsequent stock market performance vis-à-vis cash. Five of 13 relationships are statistically significant, and each of the significant relationships is negative.

Table XIV gives the results of a test of unemployment. A rise in unemployment is associated with better subsequent rewards for both stocks and bonds. While the relationship is slightly more consistent in bonds than in stocks (in bonds it fails only in Canada, whereas in stocks it fails in three countries), all the statistically significant relationships point to stronger capital market performance in the wake of high unemployment than low.

Finally, Table XV examines the effects of unit labor costs, which may reflect both employment and compensation levels. Here we find an even more consistent relationship. Rising unit labor costs hurt stock market performance in all 10 countries where this statistic is available. Bonds are hurt by rising unit labor costs in all but one country (Canada).

Conclusion

The relationships that have proved useful for asset allocation strategies in the U.S. may also

hold true for international markets. While statistical significance was not always found, the persistence of relationships from one country to another is grounds for ample encouragement. The evidence suggests that a disciplined approach to global investment management is not only intuitively appealing, it is likely to add value. ■

Footnotes

1. See J. Ernine and R. Henriksson, "Asset Allocation and Options," *Journal of Portfolio Management*, Fall 1987.
2. See R.D. Arnott and E.H. Sorensen, "The Equity Risk Premium and Stock Market Performance" (Salomon Brothers Inc, New York, July 1987).
3. The data cover various time spans. For most countries, the data covered December 1982 through February 1987, but for Australia, Austria, Japan, Spain, Sweden and the U.K., data began on September 1979 or July 1981.
4. See R.D. Arnott and J.N. von Germeten, "Systemic Asset Allocation," *Financial Analysts Journal*, November/December 1983 and Arnott, "The Pension Sponsor's View of Asset Allocation," *Financial Analysts Journal*, September/October 1985.
5. See Arnott and von Germeten, "Systematic Asset Allocation," *op. cit.*
6. See R.D. Arnott, "Risk and Reward—An Intriguing Tool" (Salomon Brothers Inc, New York, April 6, 1987).