Global Tactical Asset Allocation

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Abstract

We provide a framework for using conditioning information in the process of global asset allocation. While we discuss strategies in a global setting, the same reasoning can be applied to other asset allocation programs with different investment objectives.

Three Levels of Asset Allocation

The goal of asset allocation is to get the best possible expected return/risk profile. It is useful to distinguish three levels of asset allocation. These modes of asset allocation are detail in Exhibit 1.

Benchmark asset allocation is a program that exactly replicates the investment weights of the benchmark index. For example, if the manager is benchmarked to the Morgan Stanley Capital International (MSCI) world portfolio, the benchmark asset allocation assumes the same weights as this index. This type of asset allocation is sometimes referred to as indexing. No information is used other than the usual details of indexing: determining market weights and managing delistings, new listings, buybacks, secondary market offerings, dividends and warrants.

If the benchmark is very broad, like the MSCI world, this asset allocation is sometimes referred to as 'equilibrium' asset allocation. This convention arises from the main implication of the Capital Asset Pricing Model (CAPM) that investors hold the world market portfolio in equilibrium, levered up or down to match the desired risk aversion

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(Sharpe 1964, and Black 1972). Indeed, we often assume that the ex ante variance-covariance structure is represented by the historical and deduce the expected returns that are implied by the market investment weights. That is, given a variance-covariance matrix, we can back out of the optimization the expected returns that exactly imply the market weights. These expected returns are often referred to as the equilibrium expected returns. However, we need to be careful here. There are many known caveats to the CAPM holding. As such, we prefer to refer to this asset allocation as the benchmark allocation.[1]

The second level of asset allocation is the "Strategic Asset Allocation." This asset allocation is typically long-term in nature, usually with a five-year horizon. Investment managers place bets or tilts based on long-term views of asset class performance. For example, it may be the manager's view (either based on a quantitative model, judgement or both), that Japanese government bonds will underperform (relative to historical performance) over the next five years. A decision would be made to deviate from the benchmark. While the weights are based on five year forecasts, it is not usual to update the five-year forecast every year and, hence, rebalance annually. The deviation from the benchmark introduces tracking error. The tracking error is the standard deviation of the differences between the benchmark return and the portfolio return. For our purposes, the strategic deviations from benchmark will induce 'strategic' tracking error.

The third level of asset allocation is the "Tactical Asset Allocation." Here investment managers will take short-term bets, usually one month to one quarter, and deviate from the strategic weights. This also induces tracking error. The difference between the strategic and tactical weights induces 'tactical' tracking error. The difference between the benchmark weights and the tactical weights is the 'total' tracking error. Note that the strategic and tactical tracking error standard deviation does not necessarily sum to the total tracking error because of potential correlation between strategic and tactical weights over longer horizons.

Because of the frequent changes in investment weights in tactical programs, transactions costs are particularly important. The usual strategy here is to minimize transactions costs by minimizing transactions in the physicals (i.e., the equities and/or bonds) and to use futures or swaps to manage the tactical deviations. That is, if the

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[1]Black and Litterman (1992) develop an asset allocation model in which the world market portfolio is the equilibrium portfolio, and deviations from this holding depend on the manager's market views as well as a measure of uncertainty for each of these views.

benchmark is the MSCI world, an initial portfolio may be formed from the physicals or underlying stocks. Both strategic and tactical deviations can largely be managed with futures and equity swaps. If the strategic weights are slow moving, it is also possible that the initial physical portfolio is set at the strategic weights and futures/swaps are used to manage the deviation from strategic to tactical.

Given the ability to used futures and swaps to manage tilt at minimal cost, one could argue for the existence of a new, fourth level of asset allocation – the "High-Frequency Tactical Asset Allocation." This allocation runs on a daily or intraday basis. It is usually driven by quantitative models.

Variation in Investment Weights Through Time

The intensity of changes in investment weights vary with each asset allocation level. The benchmark allocation is almost always value weighted. As a result, there is very little change in investment weight. Indeed, most of the changes in weights are purely technical. This level is sometimes characterized as passive asset management.

Weight changes increase with strategic programs. It is unusual to make a strategic change more than once a year. However, within the year, there may be rebalancing to keep to the strategic objective. For example, suppose we have a simple mandate to invest in the U.S. and EAFE (Europe, Australasia, and Far East). The benchmark (capitalization) weights are 70% and 30%. The strategic asset allocation underweights the U.S. and overweights EAFE, say 50% and 50%. Suppose the equal allocation is set January 1. If the U.S. performance exceeds that of EAFE in January, then the investment weights will deviate from the strategic objective. In order to maintain the strategic objective, some U.S. exposure will be sold and additional EAFE will be purchased. Basically, we will be selling some of the winning equities and buying some that have performed poorly. This is a contrarian-like rebalancing strategy.

Weight changes will be much more acute for tactical and high-frequency tactical programs. As mentioned earlier, it is critical to use swaps and futures to reduce the transactions costs of the investment weight management.

Conditional versus Unconditional

How is information used to determine weight changes? Here we will draw a distinction between conditional and unconditional allocation.

Unconditional implies the following. You base the expected returns and the variance-covariance inputs into the asset allocation purely on past realizations of the returns. For expected returns, this is simply the mean return which is assumed to be constant.

Given that the goal of asset allocation is to provide the best portfolio given the expected returns and variances, one needs to assume that the historical average returns are the future average returns. In practices, it is notoriously difficult to estimate the long-term mean return. On the other hand, the conditional approach uses information available today, over and above the information in past asset returns. In this framework, the mean changes through time depending on the values of the information variables that are being used in the forecasting equation.

The following is a simple, regression-based, interpretation. Suppose we have a long time series of monthly equity returns. Suppose we regressed these returns on a constant. This is an unusual regression (with no explanatory variables). It is a regression that has a single coefficient – the intercept. In this regression, the intercept represents the expected return and is exactly equal to the historical average monthly return. The fitted value of regression is identical at each point in time (hence the interpretation that the mean is constant). The fitted value may vary to a small degree as more data comes in and the mean is updated.

Contrast this with a regression with a single explanatory variable, say the lagged difference between long-term Treasury yields and short-term Treasury bill yields. The fitted values from this regression change through time as the yield spread changes. Our expected values are 'conditional' on the slope of the yield curve. Exhibit 1 summarizes the forms of asset allocation and the distinction between conditional and unconditional information.

Using Conditioning Information in Asset Allocation

How is conditioning information used in the various levels of asset allocation? In the benchmark allocation, no conditioning information is used. Indeed, conditioning information is usually used to develop deviations from the benchmark.

For strategic asset allocation, often long-horizon forecasting models are employed with five year overlapping returns. The conditioning information causes the five year expected returns to change through time.

Strategic asset allocation is sometimes done in an unconditional framework, though this is particularly perilous. For example, one might simply assume that the last five

years of returns will be reflected in the next five years of returns. Sometimes longer initial sample are used.

This is perilous because it assumes that no other information is relevant. In the regression context, this is known as an omitted variables problem. That is, when we omit variables from the regression our coefficient estimates are biased. With omitted variables the historical mean is an inaccurate, imprecise measure of the conditional expected return. Note the following. In the regression model, if no explanatory variables are significant, then the fitted value simply reflects the historical mean. That is, the unconditional mean is a special case of the conditional (when no extra information is relevant). So, overall, conditioning information is most often used in strategic allocation although a disturbing number of practical implementations are based on unconditional information.

For both categories of tactical asset allocation, conditioning information is always used. Forecasting models are constructed on, usually, a monthly basis. Expected short-term returns are the basis for weight changes.

While most of the discussion has been based on expected returns, the conditional and unconditional distinction applies in the same way to variances and correlations. The unconditional volatility is the historical standard deviation. In an asset allocation based on an unconditional framework, you need to believe that volatility is constant. Casual inspection of the data as well as the direct inspection of option implied volatilities, suggests that volatility is not constant.

Again, using unconditional measures of the variance-covariance matrix is perilous. However, it is important to keep in mind that getting the conditional mean right is far more important than getting the conditional variance-covariance right. As a result, it is fairly commonplace to use unconditional variance-covariance matrices in both strategic and tactical analysis.

A Mean-Variance Interpretation of Conditioning Information

We can also visualize the role of conditioning information in the standard mean-variance framework of Markowitz (1952). Suppose the strategic allocation is purely based on historical returns. We use the historical means, variances and covariances as inputs into a mean-variance optimization. We establish the efficient portfolio to get the best trade-off between mean and variance.

Based on the ex post data, this portfolio is a fixed weight portfolio. That is, the

weights that we get from our optimization need to be rebalanced during every month of the sample to exactly start the next month with the investment weights.

Now consider adding some conditioning information. Consider the following example. Suppose we begin with two asset classes – the MSCI world portfolio and a U.S. Treasury bill. Suppose we form an efficient frontier based on unconditional information (the historical means, volatilities and correlations). Now, consider a variable that is able, to a small degree, to predict returns, such as the U.S. Treasury yield spread. Construct two additional asset classes by multiplying both the world equity return and the Treasury bill times the lagged value of the yield spread. As a result, we now have four assets. In reality, there are only two 'basis' assets, world equity and Treasury bills. The extra two assets are known as dynamic trading strategies.[2]

Solve the portfolio problem with these four assets. With four assets compared to two assets, the frontier will shift to the left. This is illustrated in Exhibit 2 with data from January 1970 to December 2000. The new portfolio frontier can be expressed in terms of the two basis assets and the lagged value of the yield spread. In this particular case, the weights in the two basis assets will change through time as the value of the yield spread changes. As a result, using conditioning information induces weight changes, unless the conditioning information has no predictive ability.

The Foundations of Predictability

It is difficult to predict equity returns. There are at least two reasons. First, equity returns are highly volatile. Second, the markets that they trade are highly efficient – quickly incorporating information into asset prices. It is important to realize that the existence of a low degree of predictability does not necessarily mean the market is inefficient (see, for instance, Fama, 1991).[3] It is best to explore this idea by considering the forces that might allow for predictability.

There are at least four fundamental sources of value and each of these sources might have some predictability. In the simplest model, equity value is determined by: expected cash flow, expected market risk premium, expected market risk exposure, and the term structure of interest rates. These sources fall out of the simple framework

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[2]Hansen and Richard (1987) provide the mathematical underpinnings for the idea of dynamic trading strategies in an abstract setting. Bansal, Dahlquist and Harvey (1996) incorporate dynamic trading strategies in a performance evaluation.

[3]Ferson and Harvey (1991) provide evidence supporting the conjecture that predictability is the outcome of time-variation in expected returns.

that the equity value today is the present value of future expected cashflows. There are additional sources of value arising from the cross-correlation of each of these terms – but we will concentrate on the fundamental sources. For simplicity, let's consider an individual equity. We can aggregate to the market index.

Expected Cash Flows

The firm's cash flows often move with the business cycle. Both the business cycle and the firm's cash flows are slow moving and persistent. That is, it is unusual (but possible) to go from highly profitable to highly unprofitable in one quarter. This persistence translates into both short and long horizon predictability. This is the numerator in the present value calculation.

Market Risk Premium

The market risk premium is what we want to predict after we aggregate the individual equities. We do know the following. At business cycle peaks, the equity risk premium is low. At business cycle troughs, the equity risk premium is high. The intuition is that at business cycle troughs, investors are short of cash because they are using whatever discretionary cash to smooth their consumption. They do not have much discretionary cash for equity investing. As a result, the premium (market expected return over and above the Treasury bill) must be high to draw people into the market. The opposite holds at peaks. Here, there is a lot of discretionary income that can be used for long-term investments. Prices are bid up and expected premiums are low. The market premium is a component of the discount rate which is the denominator of the present value calculation.

Firm Risk Exposure

There is a considerable literature that shows that firms' risk exposures change through time. This is due to the differential performance of the industries that they participate in. It is also a result of the firm's performance within a particular industry. Exposure will also vary with the firm's capital structure. That is, risk will increase with the degree of leverage. The degree of leverage is often associated with market performance and the business cycle. The evolution of risk exposure is slow, persistent and, therefore, somewhat predictable. The risk exposure, in part, determines the discount rate we use in the net present value calculation.

Term Structure

The value of the firm is the discounted value of the cash flows. The discount rate is determined by the market premium, the firm's risk exposure and the risk free rate. Given that interest rates are different at different horizons, we often use the entire term structure of interest rates in the valuation. The term structure reflects expectations of real interest rates, real economic activity and inflation.

The Business Cycle and Asset Allocation

One common component of all four foundational variables is the business cycle. The business cycle is persistent and it is possible to partially predict real economic growth. There are many reasons for this. Consumers have a tendency to smooth consumption. Investment is sticky, i.e. corporate investment in projects is usually long-term in nature. Government expenditures have a low level of variability.

Let's explore how the business cycle impacts returns. In particular, we examine the U.S. business cycle and the impact on global equity returns. While there are a number of studies that show benefits to international diversification, these studies assess benefits within the context of correlation measures. We propose something simpler.

Exhibit 3 shows two average returns for each country using MSCI data through November 2000. The first is the average return (in U.S. dollars) during the months that the U.S. was officially in expansion (trough to peak). The second is the average return during the months that the U.S. was officially in recession (peak to trough). The exhibit is rather dramatic. For the U.S., average returns during recessions are about one third of the level during expansions. This is not surprising. What is dramatic is the impact on other countries. While average correlation would suggest some diversification benefits for international investment, Exhibit 3 shows that there is no where to hide from a U.S. recession. In almost every country, the difference between expansion and recession average return is more acute than the U.S. difference. Put differently, other countries' equity returns are more sensitive to the U.S. business cycle than the U.S. equity return!

What about the other inputs for asset allocation? Exhibit 4 shows that volatility is greater during U.S. recessions in almost every country. This makes some sense because with declining equity values, the market leverage of each country increases.

Correlation with the world is the next measure. A priori, it is not clear what to

expect. Correlation is just the ratio of covariance of the country return and the world divided by the product of the country and world standard deviations. We already know that the standard deviations increase. As a result, the denominator in the correlation will increase during recession. This tends to reduce correlation.

Exhibit 5 shows a different story. Correlations increase during recession. Perhaps this is obvious from the return performance (all countries perform poorly in recessions in Exhibit 3). Given that volatilities increase during recession, there must be a huge effect in the covariances. Exhibit 6 shows the covariances. Indeed, we find a sharp difference in covariances during recessions and expansions – in every developed country tracked by MSCI.

The Predictability of the Business Cycle

We mentioned earlier that the U.S. business cycle is partially predictable. Given the evidence in Exhibits 3–6, this predictability will be important for the tactical asset allocation decisions. Given that the behavior of returns is strongly impacted by the stage of the business cycle and given that the business cycle is partially predictable, this implies that the behavior of returns is predictable. That is, the same variables that predict the business cycle show predict returns, volatilities and correlations.

Consider one example – the slope of the U.S. term structure of interest rates. Harvey (1988) established the relation between the spread between government yields and future economic activity. We already know that the term structure is fundamentally important in valuation (it was our fourth source of value).

Exhibit 7 shows the recent behavior of the term structure of interest rates. Inversions of the term structure are associated with future recessions – in all recessions since 1970. The inversion is the state where short term interest rates exceed long-term interest rates. The lead time to recession ranges from three to five quarters. Exhibit 8 show that the slope of the term structure tells us something about the future state of the economy, here the real economic growth.

What about equity returns? Exhibit 9 considers equity returns one month after inversions for individual developed markets, whereas Exhibit 10 considers portfolios formed by the individual markets. The exhibit shows that equity returns are predictable given the slope of the yield curve in the U.S. This predictability needs to be incorporated into the tactical asset allocation decision.

Importantly, this example shows only one source of predictability – indeed, only a

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single variable. Other variables that help predict returns are also closely related to the stage of the business cycle. For instance, lagged returns, valuation ratios (like dividend-price, earning-price, and book-price ratios), interest rates, yield spreads, and default premia have been used as conditional information in the U.S. market.[4] These variables typically predict counter-cyclical variation in returns. In an international context, Harvey (1991, 1995), and Ferson and Harvey (1993) document that stock returns are predictable in developed and emerging markets as well. They use similar conditional variables as for the U.S. market in addition to variables which proxy for expectations about the strength of the world economy and variables linked to market integration. Bekaert and Hodrick (1992) and Bansal and Dahlquist (2000) are examples of recent studies documenting predictability in currency returns.

Predictability is often assessed via so-called R-squares in regressions. An R-square measures how much of the variation in returns that can be attributed to the conditional information variables. It is common to find predictability of between 1% and 10% in terms of R-squares (depending on which type of asset, market, or sample period that is considered). Predictability has been shown to be particularly strong at longer horizons (3-5 years), with R-squares as high as 30%.

Standard performance measures, such as ratios of expected excess return to volatility (Sharpe ratio), can be substantially improved when conditional information is used in forecasting. In fact, one does not need much predictability to impact the asset allocation process. Kandel and Stambaugh (1996) find that even with low precision (an R-square of only 2%), asset allocation can be dramatically altered as a result of the predictions. This was also demonstrated in our Exhibit 2. That is, moderate predictability can be of large economic importance.

Concluding Remarks

We provide a framework for using conditioning information in the process of global asset allocation. An important lesson emerged. There is considerable work documenting predictability of returns using past information variables. Many of these variables are related to the stage of the business cycle, and suggest that much of the predictability in these assets, or markets, are common. The fact that returns are predictable means that active asset allocation strategies can outperform passive strategies. Uncov-

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[4]Campbell (1987), Campbell and Shiller (1988a, 1988b), Fama and French (1988a, 1988b, 1989), Hodrick (1992), Keim and Stambaugh (1986), and Poterba and Summers (1988) provide early evidence on predictability.

ering the predictability is challenging as it simply allows managers to beat traditional benchmarks.

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EXHIBIT 1
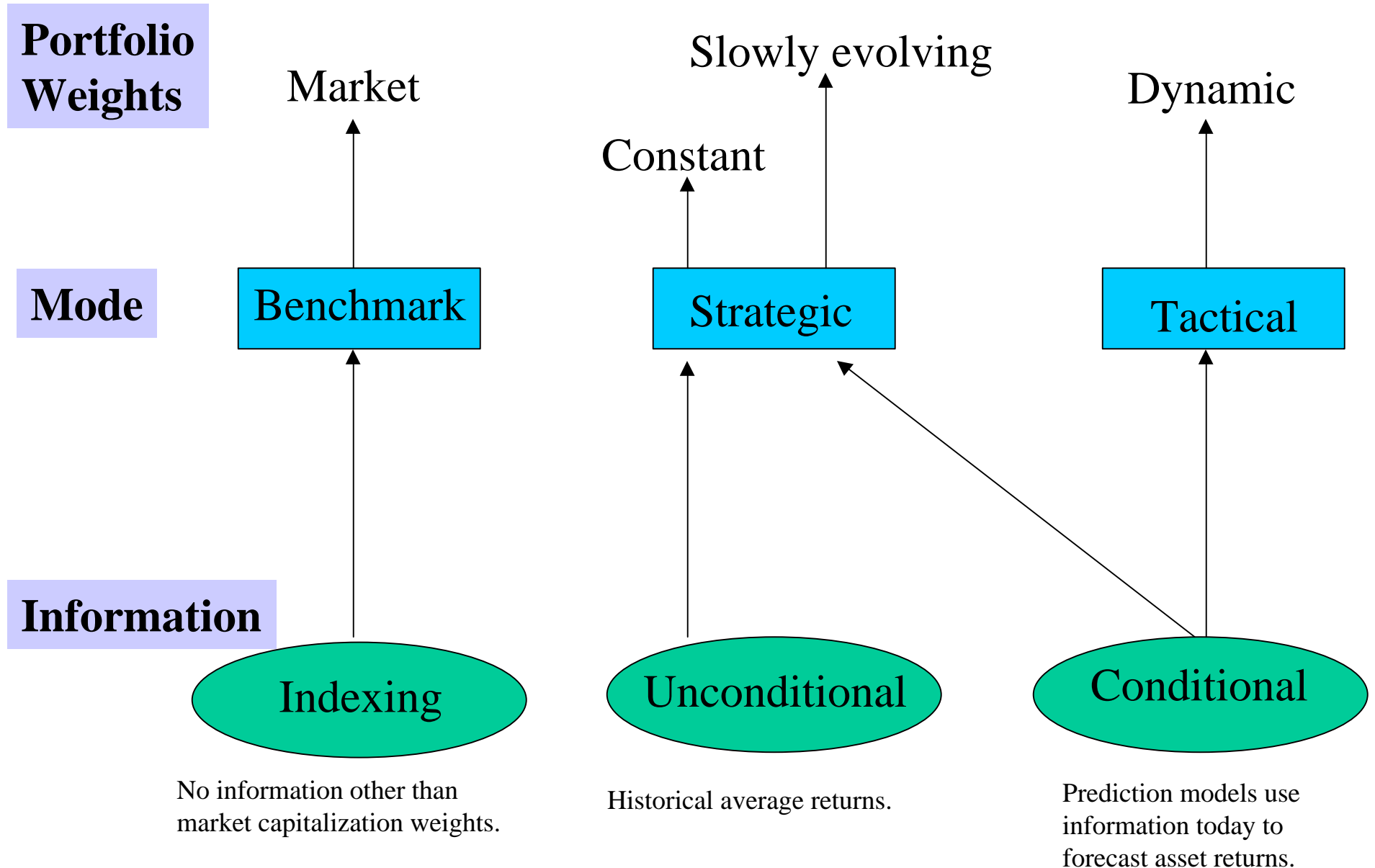# Three Modes of Asset Allocation

Portfolio Weights	Market	Slowly evolving	Dynamic
		Constant	
Mode	Benchmark	Strategic	Tactical
Information	Indexing	Unconditional	Conditional

No information other than market capitalization weights.

Historical average returns.

Prediction models use information today to forecast asset returns.

EXHIBIT 2
Mean-Variance Frontiers
Fixed Weights versus Dynamic Strategies
Two Assets: MSCI World and U.S. Treasury Bill
Conditioning Information: Lagged U.S. Term Structure Slope
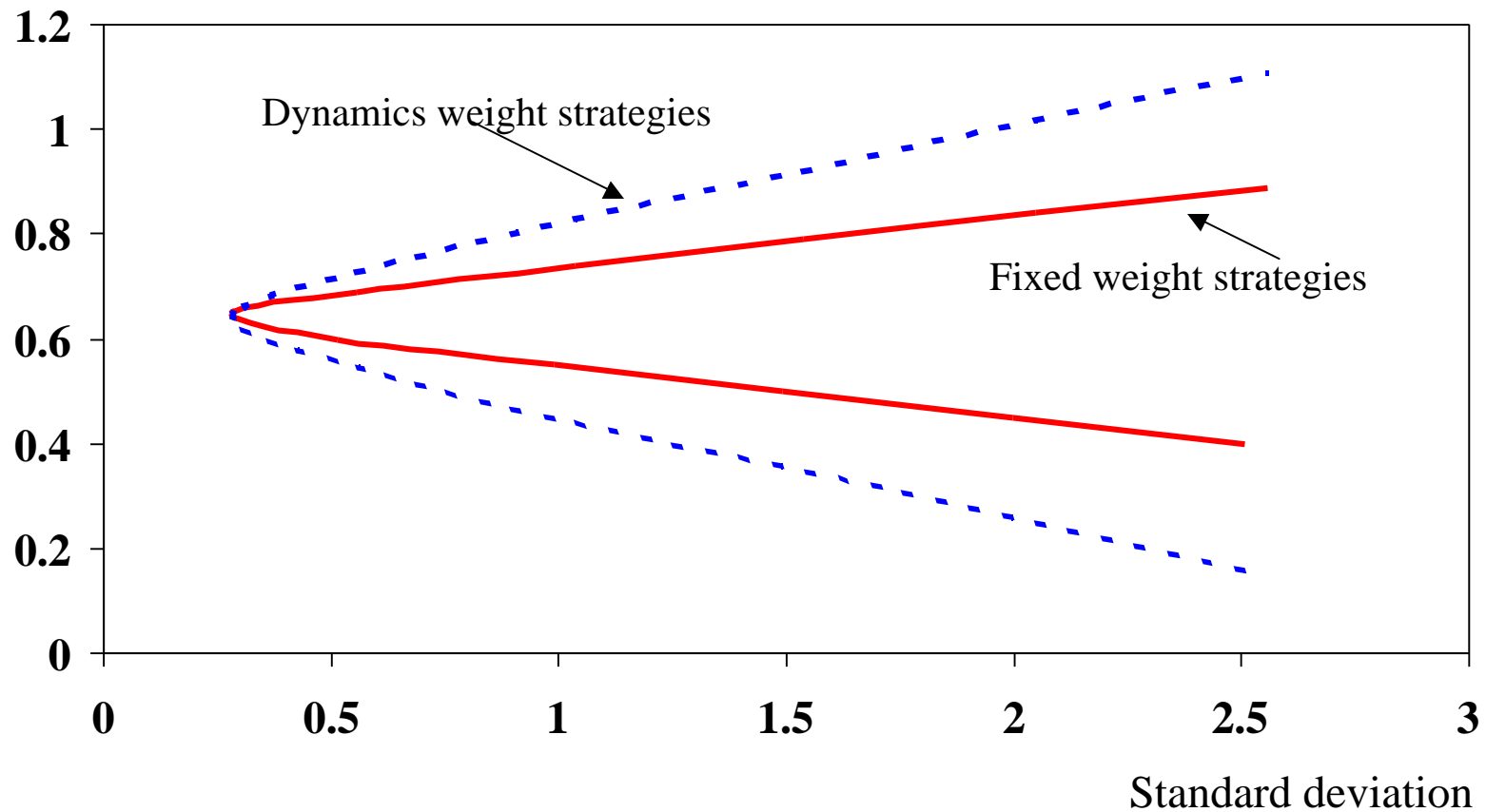
EXHIBIT 3

Equity Performance and the Business Cycle
Average Monthly Returns in %

Legend: U.S. Contraction | U.S. Expansion

Categories: AU, AT, BE, CA, DK, DE, HK, IT, JP, NL, NO, SG, ES, SE, CH, UK, US, WO
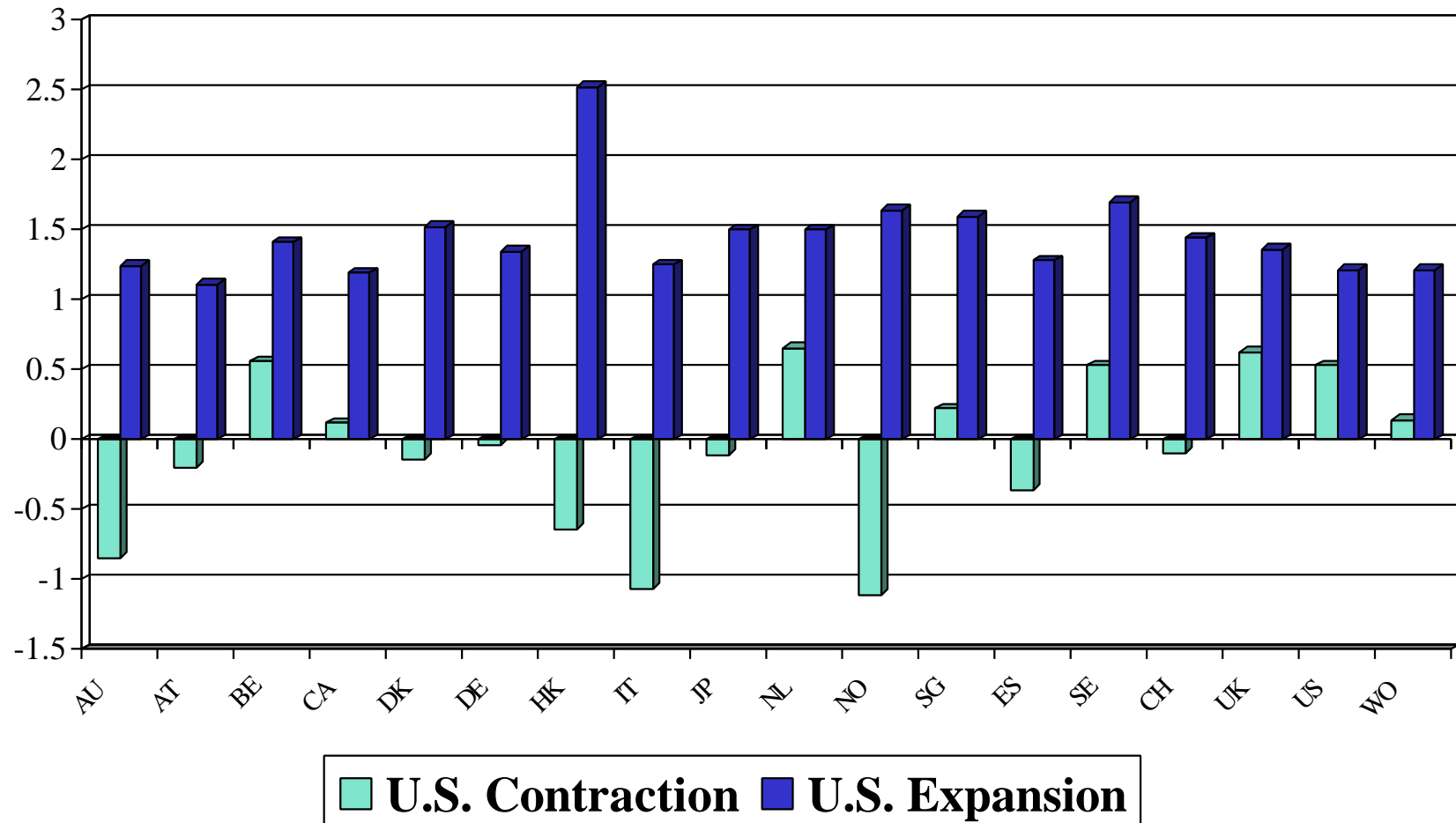
Data through
December 2000

EXHIBIT 4

Equity Performance and the Business Cycle
Average Monthly Standard Deviation of Returns in %
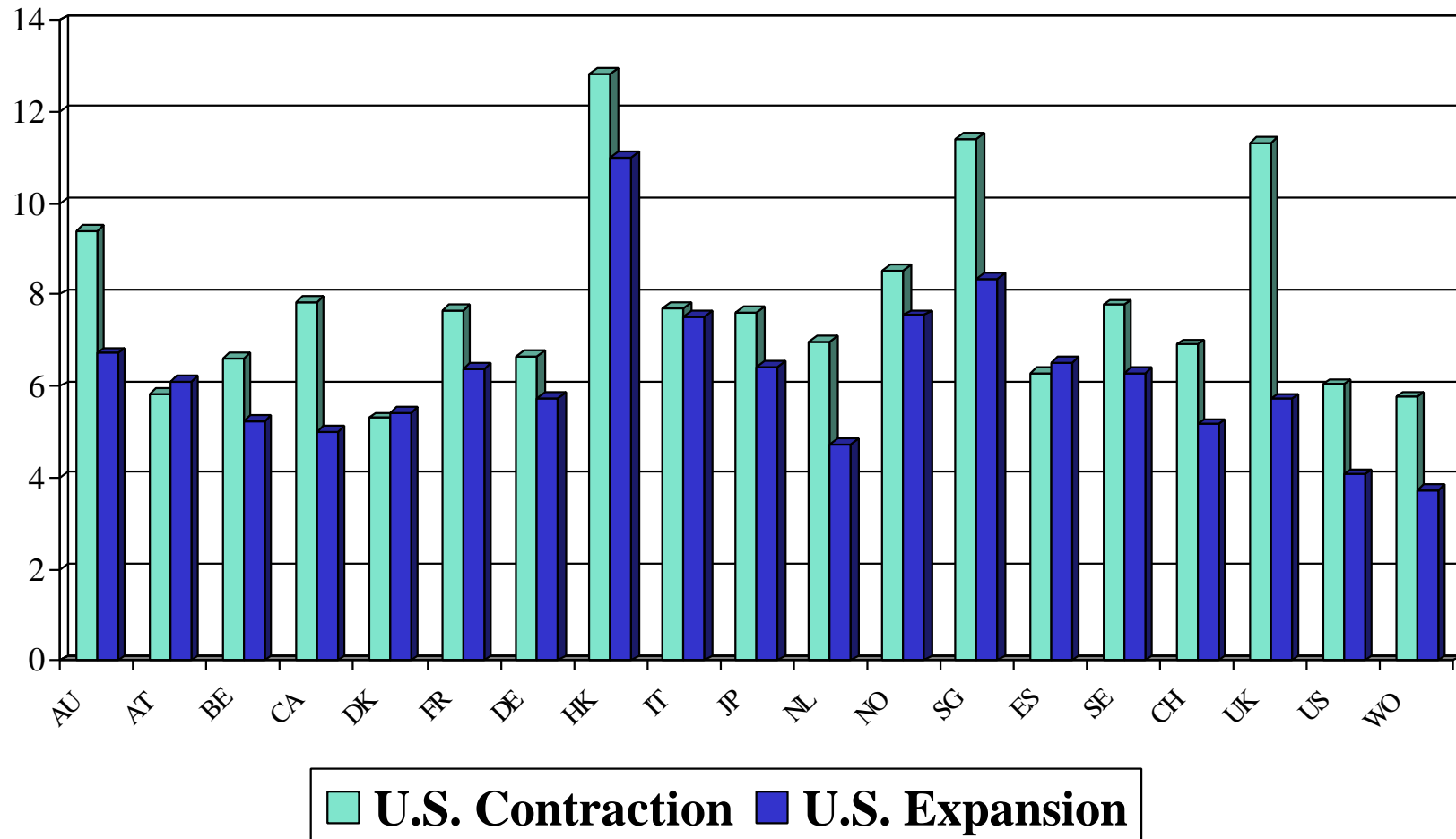
Data through
December 2000

EXHIBIT 5

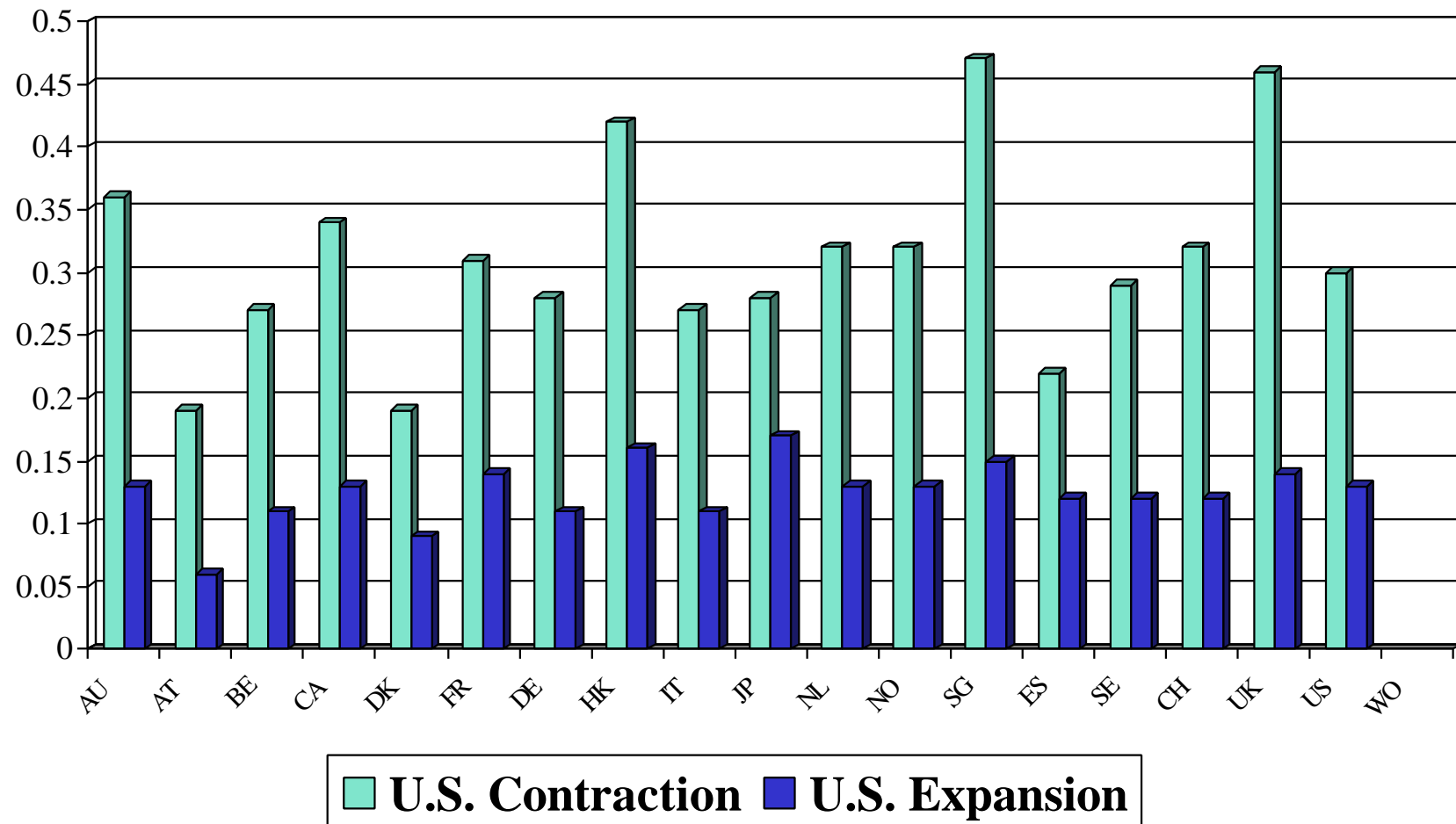# Equity Performance and the Business Cycle
Correlation of Returns with World
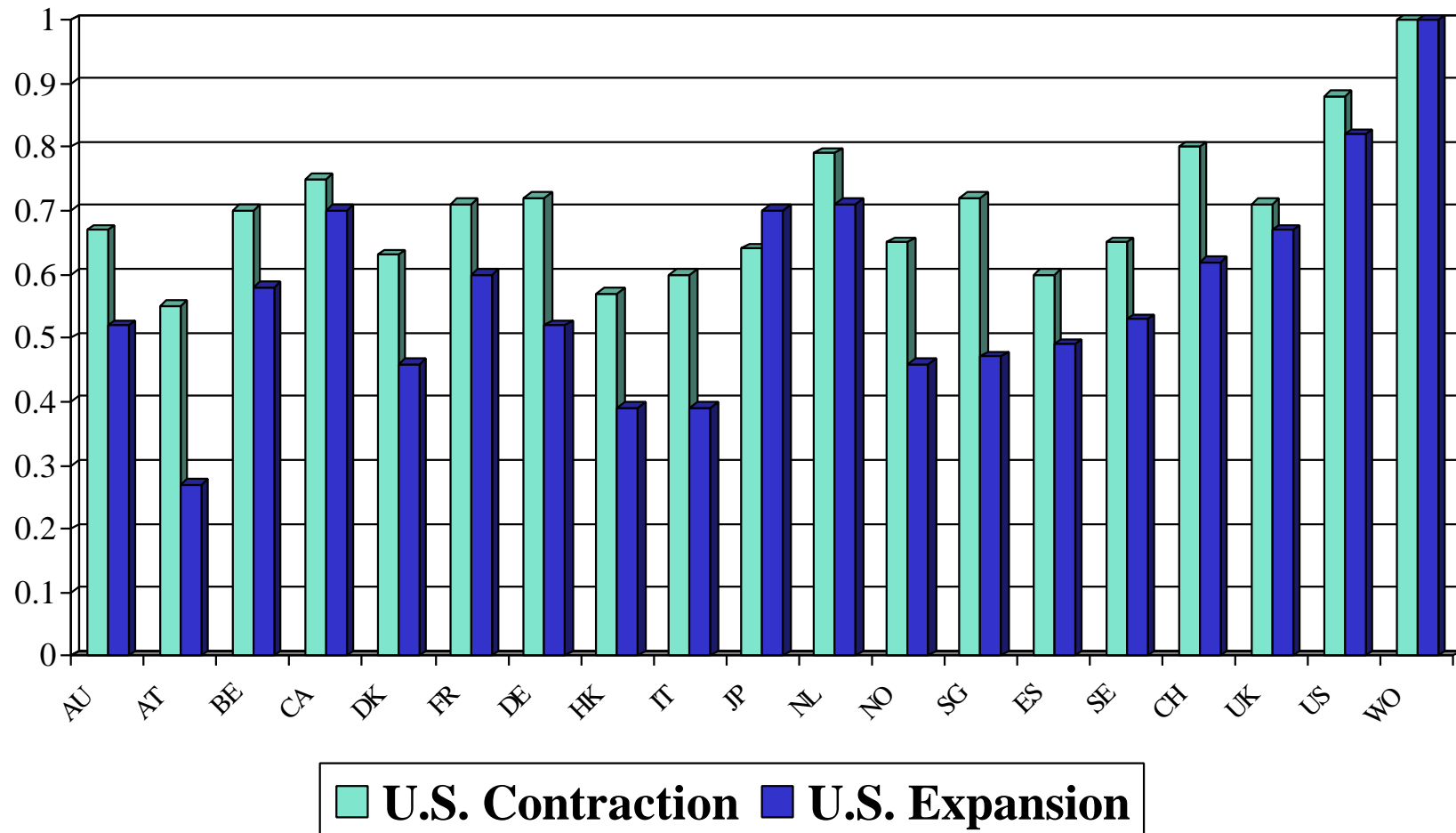
Data through
December 2000

EXHIBIT 6

Equity Performance and the Business Cycle
Covariance of Returns with World

Data through
December 2000

EXHIBIT 7

U.S. Yield Curve Inverts Before Last Five Recessions
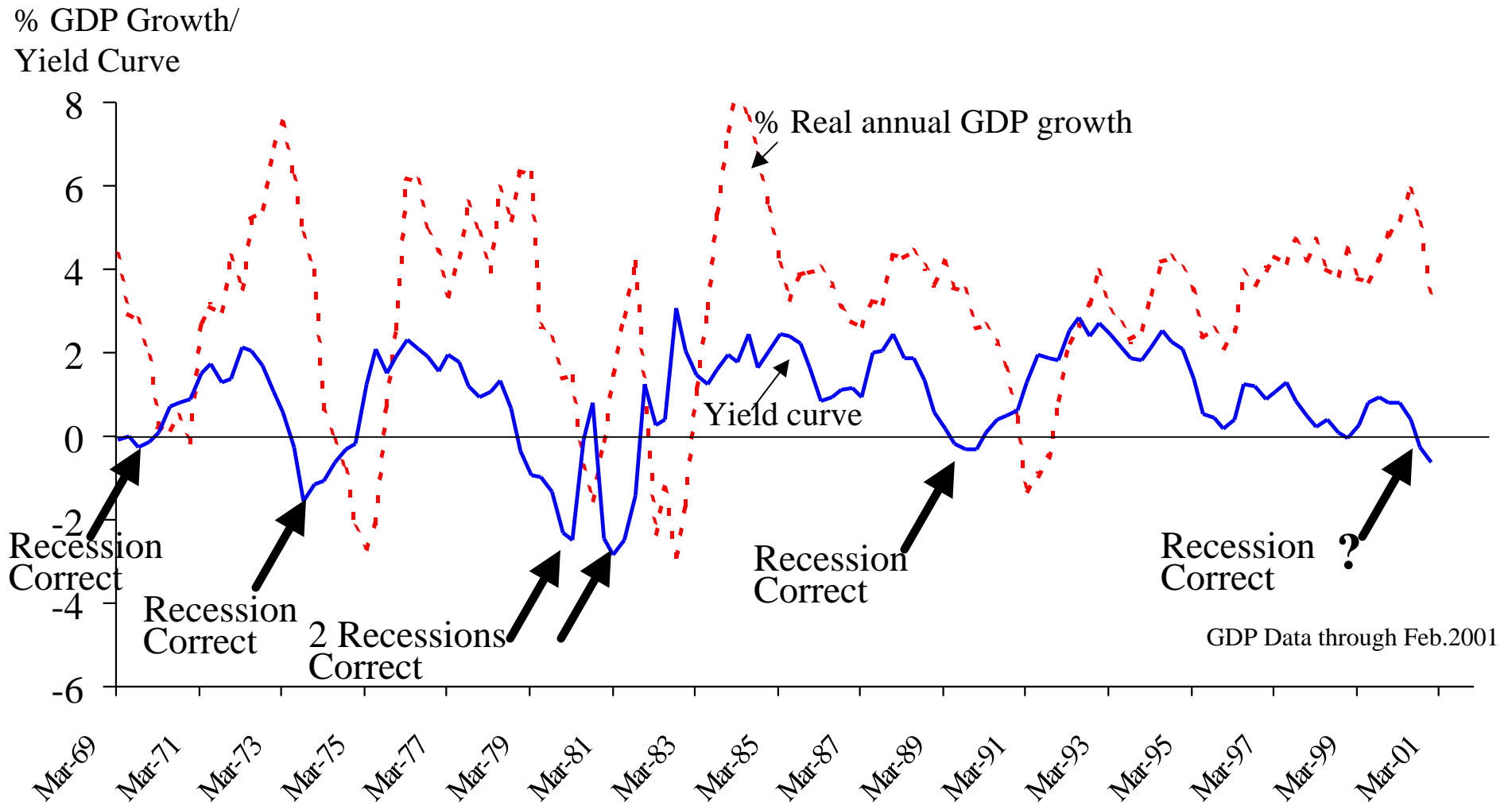### (5-year Treasury bond - 3-month Treasury bill)

% GDP Growth/
Yield Curve

% Real annual GDP growth

Yield curve

Recession
Correct

Recession
Correct

2 Recessions
Correct

Recession
Correct

Recession
Correct

?

GDP Data through Feb.2001

EXHIBIT 8

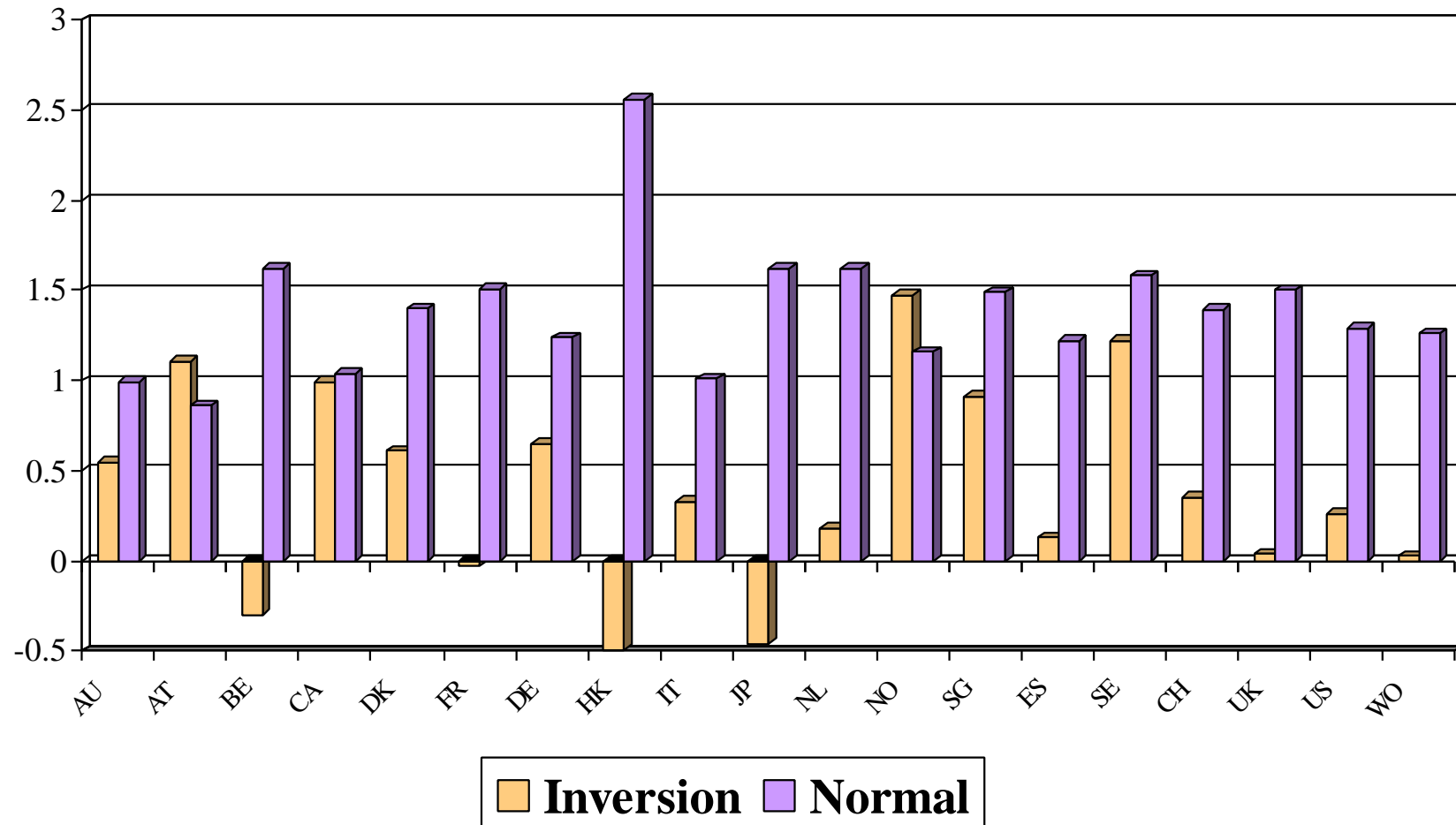# Annual Real Economic Growth After Yield Curve Inversions
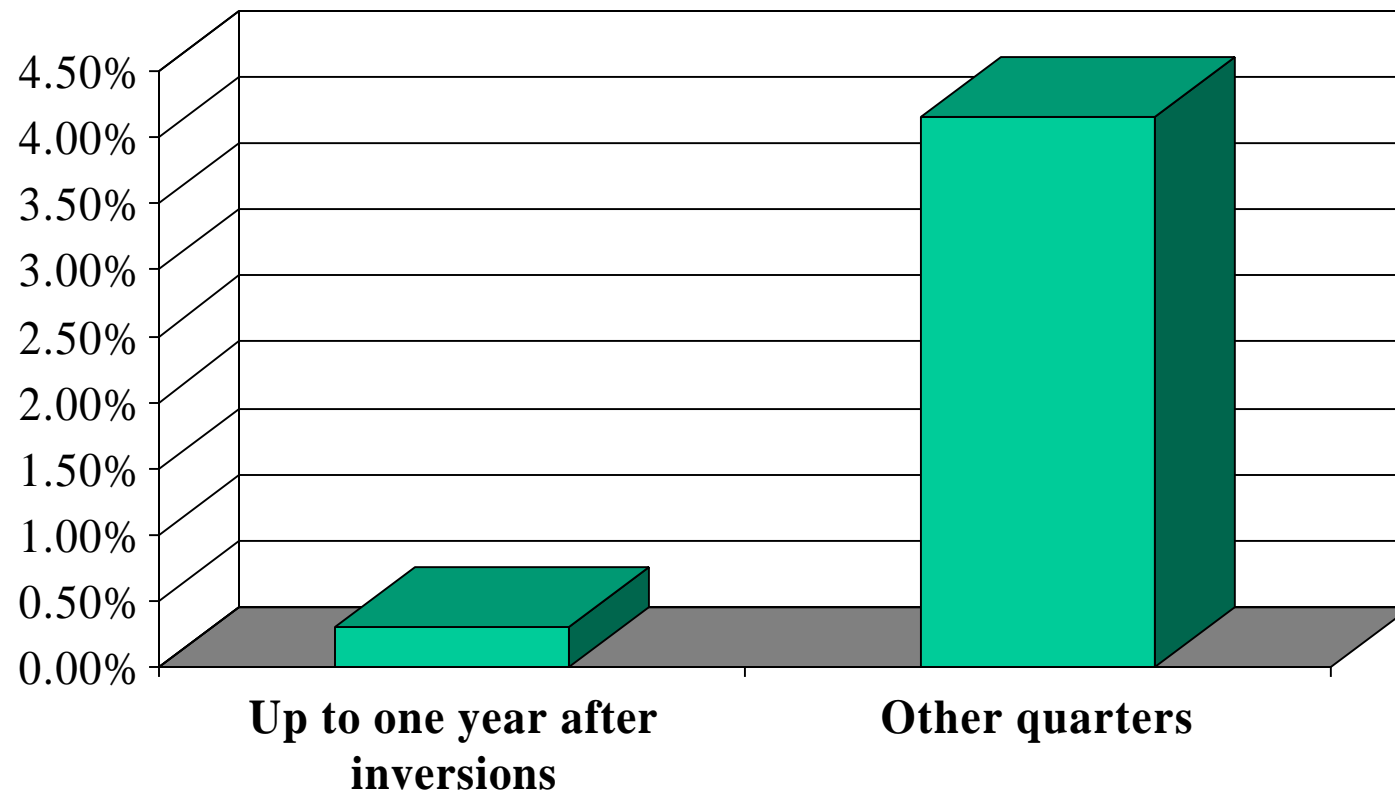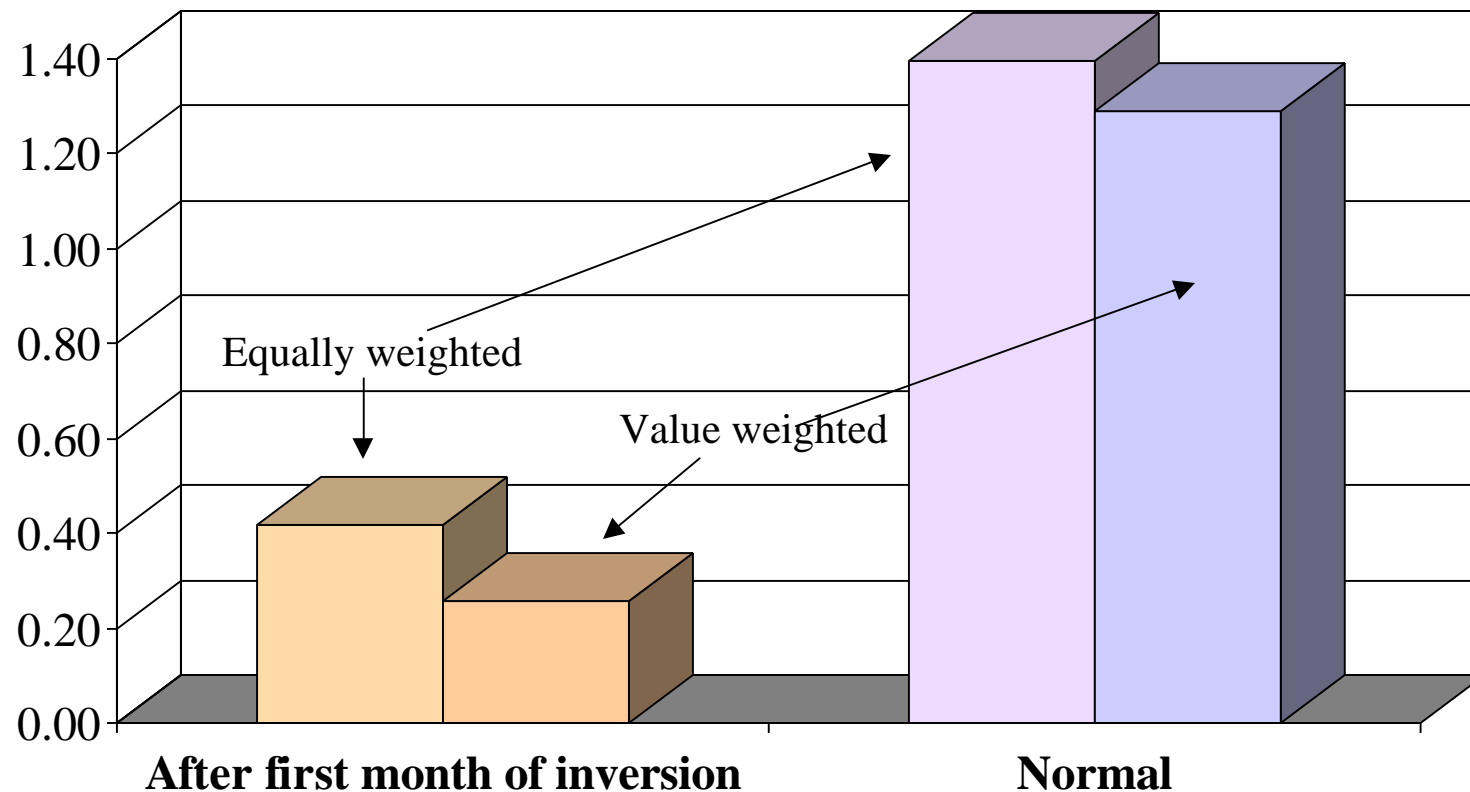
EXHIBIT 9

Stock Returns and U.S. Yield Curve

Average Monthly Returns in %

Data through
November 2000

EXHIBIT 10

Average Monthly Stock Returns (in %) After Yield Curve Inversions

Based on 19 countries.