The Index Investor

Invest Wisely…Get an Impartial Second Opinion.

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This Month's Issue: Key Points

This month we take on two challenging questions: what rate of return should we expect equities to deliver in the future? And given this, are equity markets fairly valued today?

Fundamentally, in an efficient market the future return an equity index should reasonably be expected to supply should be equal to the rate of return investors demand in order to hold risky equities. The future return supplied is a function of two factors: the market's current dividend yield (the dividend/price ratio) and the rate at which dividends will grow in the future. The rate demanded by investors is also a function of two variables: the current yield on real return bonds, and the equity market risk premium.

However, we have concluded that the weight of recent research suggests that the supply of and demand for equity market returns are not always in balance, and markets can therefore be over and undervalued. We reviewed this evidence at length in our February, 2004 article, "Has the Death of Efficient Markets Killed Indexing Too?" Since then, other research has been published that reaches the same conclusion. We review two important articles on this subject in this issue.

We also review the research on estimating the key variables in our supply/demand relative valuation model. We find that multifactor productivity growth seems to be the economic measure that most closely corresponds to likely future dividend growth (in real

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terms). We estimate future values for this variable of between 1% and 2% per year. We also find that a reasonable range for the equity risk premium seems to lie between 2.5% and 4.0%, which are below historical realized excess returns (that is, equity market returns less the return on bonds).

We then review how we combine these inputs in the Dividend Discount Model to reach our conclusions about equity market over and undervaluation. After applying this model, we find that under many plausible scenarios, many equity markets appear overvalued. Because the model we use, as well as our estimation of variable input values are both subject to uncertainty, our valuation findings are indicative rather than conclusive. Still, we find them quite disturbing, but generally in line with the conclusions reached in our March Economic Update.

This Month's Letters to the Editor

What do you think of Jeremy Siegel's new book, The Future for Investors?

Dr. Siegel essentially makes two points: an investor can outperform the S&P 500 by taking value tilts and by investing internationally, via a globally diversified, market cap based index fund or funds. We do not disagree, and have made the same points ourselves. The issue we have raised with respect to value tilts is whether the additional return they have historically produced (in the long-term, if not always over the short term) represents compensation for taking on additional risk, or whether it represents a durable combination of (a) a set of investors who systematically make valuations errors, and (b) obstacles that prevent other investors from quickly arbitraging away any potential gains from these mistakes. On balance, we have come down in favor of the former explanation, while recognizing that in the short term, the latter can also sometimes be significant. In other words, over the long-term we do not believe the market offers a free lunch.

There does not appear to be a fund available in the U.K. that tracks a commodities index. What alternatives do you use in your portfolios?

The UK unfortunately still lacks a low-cost commodity futures based tracker fund. While L&G, for example, have introduced a number of global sector index tracker products,

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natural resources or commodities is not one of them. We hope that will change in the future, in the meantime the next-best U.K. alternative seems to be an actively managed fund focused on natural resources or energy. On the other hand, we have high hopes that this situation will soon improve. A new exchange traded fund was just introduced by EasyETF on the Deutsche Boerse that tracks the Goldman Sachs Commodities Index. For Eurozone ETF investors who want to allocate a portion of their portfolio to commodities, this is now our preferred vehicle.

Is there such a thing as "pure" passive investing?

No, there is not. The closest thing to a "pure" passive strategy would be a one time decision to invest in an equally weighted mix of broad asset class index funds, with no subsequent rebalancing. However, this still entails some important "active" decisions, including the definition of asset classes and selection of the ones to include in one's portfolio. However, we disagree with this approach. First, since we believe that markets are not perfectly inefficient, indexing without rebalancing runs the risk of being consistently overweight in overweight assets (assuming the use of market capitalization weighting) and underweight in undervalued assets. Systematic rebalancing hedges this risk. However, the specific design of a rebalancing strategy (e.g., whether to rebalance at regular time intervals, or only when one or more asset classes deviates by at least a certain amount above its target portfolio weight) also involves "active" decisions.

In our view, the closest one can come to a pure "passive" strategy is one that uses a mix of broadly defined asset classes that are rebalanced at regular time intervals. This is what we use for our "intellectutally honest" benchmark portfolios. However, we also believe that it is easier to forecast future asset class (beta) related risk, and to a lesser extent returns, than it is to forecast those for specific securities (alpha). This leads to our use of model portfolios that use different asset class weightings to maximize the expected probability that they will achieve different long-term compound annual real rate of return targets.

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Global Asset Class Returns

YTD 31May05	In USD	In AUD	In CAD	In EURO	In JPY	In GBP
Asset Held						
US Bonds	1.90%	5.21%	6.37%	11.06%	6.82%	6.97%
US Prop.	1.20%	4.51%	5.67%	10.36%	6.12%	6.27%
US Equity	-1.10%	2.21%	3.37%	8.06%	3.82%	3.97%
AUS Bonds	-1.69%	1.63%	2.78%	7.47%	3.23%	3.39%
AUS Prop.	-8.31%	-4.99%	-3.84%	0.85%	-3.39%	-3.24%
AUS Equity	0.30%	3.61%	4.77%	9.46%	5.22%	5.37%
CAN Bonds	-0.28%	3.03%	4.19%	8.88%	4.64%	4.79%
CAN Prop.	0.75%	4.06%	5.21%	9.91%	5.66%	5.82%
CAN Equity	-0.40%	2.91%	4.06%	8.75%	4.51%	4.67%
Euro Bonds	-5.57%	-2.26%	-1.10%	3.59%	-0.65%	-0.50%
Euro Prop.	4.75%	8.06%	9.22%	13.91%	9.67%	9.82%
Euro Equity	-3.43%	-0.12%	1.04%	5.73%	1.49%	1.64%
Japan Bonds	-3.58%	-0.27%	0.89%	5.58%	1.34%	1.49%
Japan Prop.	0.43%	3.75%	4.90%	9.59%	5.35%	5.51%
Japan Equity	-7.33%	-4.01%	-2.86%	1.83%	-2.41%	-2.25%
UK Bonds	-1.81%	1.50%	2.66%	7.35%	3.11%	3.26%
UK Prop.	-3.93%	-0.62%	0.53%	5.22%	0.98%	1.14%
UK Equity	-1.77%	1.55%	2.70%	7.39%	3.15%	3.30%
World Bonds	-1.25%	2.06%	3.22%	7.91%	3.67%	3.82%
World Prop.	0.03%	3.34%	4.49%	9.18%	4.94%	5.10%
World Equity	-1.60%	1.71%	2.87%	7.56%	3.32%	3.47%
Commodities	5.90%	9.21%	10.37%	15.06%	10.82%	10.97%
Hedge Funds	-1.06%	2.25%	3.41%	8.10%	3.86%	4.01%
A$	-3.31%	0.00%	1.15%	5.84%	1.60%	1.76%
C$	-4.47%	-1.15%	0.00%	4.69%	0.45%	0.61%
Euro	-9.16%	-5.84%	-4.69%	0.00%	-4.24%	-4.09%
Yen	-4.92%	-1.60%	-0.45%	4.24%	0.00%	0.16%
UK£	-5.07%	-1.76%	-0.61%	4.09%	-0.16%	0.00%
US$	0.00%	3.31%	4.47%	9.16%	4.92%	5.07%

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Equity and Bond Market Valuation Update

This section is being redesigned to incorporate the new assumptions discussed in this month's feature article. It will appear again next month.

Sector and Style Rotation Watch

The following table shows a number of classic style and sector rotation strategies that attempt to generate above index returns by correctly forecasting turning points in the economy. This table assumes that active investors are trying to earn high returns by investing today in the styles and sectors that will perform best in the next stage of the economic cycle. The logic behind this is as follows: Theoretically, the fair price of an asset (also known as its fundamental value) is equal to the present value of the future cash flows it is expected to produce, discounted at a rate that reflects their relative riskiness. Current economic conditions affect the current cash flow an asset produces. Future economic conditions affect future cash flows and discount rates. Because they are more numerous, expected future cash flows have a much bigger impact on the fundamental value of an asset than do current cash flows. Hence, if an investor is attempting to earn a positive return by purchasing today an asset whose value (and price) will increase in the future, he or she needs to accurately forecast the future value of that asset. To do this, he or she needs to forecast future economic conditions, and their impact on future cash flows and the future discount rate. Moreover, an investor also needs to do this before the majority of other investors reach the same conclusion about the asset's fair value, and through their buying and selling cause its price to adjust to that level (and eliminate the potential excess return).

We publish this table to make an important point: there is nothing unique about the various rotation strategies we describe, which are widely known by many investors. Rather, whatever active management returns (also known as "alpha") they are able to generate is directly related to how accurately (and consistently) one can forecast the turning points in the economic cycle. Regularly getting this right is beyond the skills of most investors. In other words, most of us are better off just getting our asset allocations right, and implementing them via index funds rather than trying to earn extra returns by accurately forecasting the ups and

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downs of different sub-segments of the U.S. equity and debt markets. That being said, the highest year-to-date returns in the table give a rough indication of how investors employing different strategies expect the economy to perform in the near future. The highest returns in a given row indicate that most investors are anticipating the economic and interest rate conditions noted at the top of the next column. Similar returns in multiple columns (within the same strategy) indicate a relative lack of agreement between investors about the most likely future state of the economy.

Year-to-Date Returns on Classic Rotation Strategies in the U.S. Markets

Economy	Bottoming	Strengthening	Peaking	Weakening
Interest Rates	Falling	Bottom	Rising	Peak
Style Rotation	Growth (IWZ) **-1.74%**	Value (IWW) **0.22%**	Value (IWW) **0.22%**	Growth (IWZ) **-1.74%**
Size Rotation	Small (IWM) **-4.84%**	Small (IWM) **-4.84%**	Large (IWB) **-0.04%**	Large (IWB) **-0.04%**
Style and Size Rotation	Small Growth (DSG) **-1.63%**	Small Value (DSV) **-4.45%**	Large Value (ELV) **-0.25%**	Large Growth (ELG) **-2.57%**
Sector Rotation	Cyclicals (IYC) **-3.68%** Technology (IYW) **-3.32%**	Basic Materials (IYM) **-6.69%** Industrials (IYJ) **-2.95%**	Energy (IYE) **13.07%** Staples (IYK) **0.18%**	Utilities (IDU) **8.40%** Financials (IYF) **-4.05%**
Bond Market Rotation	High Risk (VWEHX) **-0.40%**	Short Maturity (VBISX) **0.70%**	Low Risk (VIPSX) **2.20%**	Long Maturity (VBLTX) **5.70%**

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Are Equity Markets Overvalued Today?

This month, we're going to tackle two difficult questions: what rate of return should we expect equities to deliver in the future? And given this, are equity markets fairly valued today?

Fundamentally, in an efficient market the future return an equity index should reasonably be expected to supply is a function of two factors: its current dividend yield (the dividend/price ratio) and the rate at which dividends will grow in the future. However, simple as it appears, the right way to apply this formula in practice has been the subject of quite a bit of controversy.

Let's start with the equity market dividend yield, which is readily obtained from publications like the *Financial Times* or *The Wall Street Journal* (in their listings of the dividend yields on different market indexes). For example, the following table shows the current dividend yields in different regional equity markets:

Equity Market	Current Dividend Yield
Australia	3.9%
Canada	1.8%
Eurozone	2.9%
Japan	1.2%
United Kingdom	3.3%
United States	1.8%

The key issue here is whether this ratio should be adjusted upward to reflect stock repurchases. Companies can either distribute cash profits to their shareholders, or reinvest them in new projects or acquisitions. Distributions can be made either through the payment of dividends, or by repurchasing some of the company's outstanding shares. For people subject to tax, repurchases are theoretically preferable to dividends when capital gains are taxed at a lower rate than dividend income. The dividend yield may therefore underestimate the actual amount of cash being distributed to shareholders.

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As always, there is also another side to the argument. First, in many markets, corporate share repurchases have been legalized only recently. There is relatively little historical data available from which one can estimate future repurchase volumes.

Second, in those markets where longer data is available (e.g., the United States), the reported volume of repurchases undertaken overstates, perhaps by a substantial amount, the net amount of cash returned to shareholders by this method. The reason is that many repurchases are undertaken to offset the exercise of stock options by company managers and others. For example, a manager may exercise her option to purchase 100 shares of her company at $5 per share (i.e., a total cost of $500). This results in the new issue of 100 shares to the employee. To maintain a constant level of shares outstanding, the company would then repurchase 100 shares in the market. If they are trading at $10, the company would spend $1,000 on the repurchase.

The third argument is that share repurchases are far less predictable than dividends. This was amply demonstrated in a recent paper, "Payout Policy in the 21st Century", by Brav, Graham, Harvey and Michaely. The authors surveyed and interviewed over 400 senior financial executives on the dividends versus repurchase issue. They found that "maintaining the dividend level is a priority on a par with new investment decisions. Managers express a strong desire to avoid dividend cuts, except in extraordinary circumstances." The authors also found that "several factors stand out as influencing repurchase policy…In contrast to decisions about preserving the level of the dividend, managers make repurchase decisions after new investment decisions. Many executives view share repurchases as being more flexible than dividends… 80 percent of CFOs report that the availability of good investment projects is an important factor affecting repurchase decisions… Companies are likely to repurchase when good investments are hard to find, when their stock's float [daily trading volume in their shares] is adequate, and to offset option dilution." For this reason, "managers are hesitant to shift from repurchases to dividends, because [this] cannot be reversed except under extraordinary circumstances."

In light of these arguments, it difficult to simply adjust the current dividend yield upward to account for the future use of share repurchases. Moreover, in those analyses that have done this, there seems to be no consensus on the right adjustment factor to use. We have

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seen estimates ranging from .5% to 1.0%; however, it is not clear whether these account for offsetting new share issues.

Difficult as this issue is, it is far less controversial than the correct rate of future dividend growth to use in an estimate of future equity market returns.

The traditional approach has been to assume that the growth in dividends will match the overall real growth rate in the economy, assuming roughly constant shares of corporate profits in national income, and dividend payouts as a percentage of corporate earnings. Traditionally, the future real growth rate of the economy is estimated using two inputs, expected population growth (as a proxy for total hours worked), and expected labor productivity growth (i.e., change in real output per hour worked).

However, three recent studies have all found that this approach substantially overestimates the actual rate of dividend growth. In their article, "What Risk Premium is Normal?", Bob Arnott and Peter Bernstein find that growth in U.S. equity prices between 1802 and 2001 was much more closely related to growth in per capita GDP, rather than overall GDP. Their explanation for this is the following: "Can't shareholders expect to participate in the growth of the economy? No. Shareholders can expect to participate only in the growth of the enterprises that they are investing in. An important engine for economic growth is the creation of new enterprises. The investor in today's enterprises does not own tomorrow's new enterprises without making a separate investment in them with new capital." In addition, "retained earnings [in the companies owned by shareholders] are often not reinvested [in projects] at a return that rivals externally available investments." The authors conclude that "since growth in real per capita GDP is a measure of the growth of productivity, it would seem that the [dividend growth] that can be sustained in a diversified market portfolio closely matches the growth of productivity in the economy, not the growth of the economy per se." However, Arnott and Bernstein also found that the growth in real dividends (.9%) has not exactly matched the growth in real per capita GDP (1.6%). In fact, it has consistently fallen short of it by .7% per year.

In a more recent paper ("Economic Growth and Equity Returns"), Jay Ritter examined the correlation between real equity returns and real per capita GDP growth in multiple countries between 1900 and 2002. He finds no strong statistical relationship between the two. However, he agrees with Arnott and Bernstein that, "empirically, what matters for stock

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returns is how much of an economy's growth comes from reinvestment of earnings into positive net present value projects in existing publicly traded companies, versus how much of it comes from personal savings that are invested in private companies or in new issues of equity from existing companies."

Finally, Professors Dimson, Marsh, and Staunton from London Business School recently addressed the linkage between economic and dividend growth in their 2005 Global Investment Returns Yearbook. They estimate the following annualized real growth rates between 1900 and 2004:

Country	**Dividend Growth Rate**	**Real Per Capita GDP Growth Rate**
Australia	1.2%	1.9%
Canada	0.6%	2.1%
France	-0.4%	2.2%
Germany	-1.7%	1.5%
Japan	-2.9%	3.6%
United Kingdom	0.5%	1.8%
United States	1.0%	2.0%
World*	0.6%	2.2%

* GDP weights to 1968; market capitalization weights thereafter.

Dimson, Marsh and Staunton note that "higher economic growth was not associated with higher real dividend growth…Statistically, we cannot reject the hypothesis that there is no association between past economic growth and future stock market performance." On the other hand, they find that the reverse is not true: in many countries, past stock market returns predict future GDP growth.

When it comes to estimating future equity market returns, is there a way out of this conundrum? We believe there is, and that it starts with a better understanding various measures of productivity growth. Both output per hour and GDP per capita are measures of labor productivity growth. In theory, there are two contributors to labor productivity growth. The first is an increase in the amount of capital per worker. A simple example of this is the amount of output that can be produced by a farmer using only hand tools versus one who

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owns a tractor. Technically, this is called "capital deepening." The second source of labor productivity growth is called either "multifactor productivity growth" (MFP) or "total factor productivity growth" (TFP). In theory, this accounts for intangibles, better ways of organizing production, better labor/management relations, technological changes, and the like. In practice, it is measured as a residual, after subtracting the effect of capital deepening from labor productivity growth.

Unfortunately, there are also a great number of measurement issues associated with MFP, including how to accurately measure capital inputs, how to distinguish between technological improvements that are embodied in capital (e.g., a more efficient machine) and those that are not (e.g., a different chemical forumulation), and how to distinguish between improvements in MFP and the quality of human capital (e.g., due to more years of education, or better schooling methods). An excellent review of these issues is provided in two papers: "How Important are Capital and Total Factor Productivity for Economic Growth?" by Baier, Dwyer, and Tamura; and "Interpreting Productivity Growth in the New Economy: Some Agnostic Notes" by Erich Gundlach. The latter makes the critical point that capital deepening cannot go on forever; in the long-term, labor productivity growth – whether in a country or a company -- must be driven by MFP growth.

As you can see from the following OECD data, growth in MFP is much lower than growth in labor productivity:

Region	**Average MFP Growth, 1981 - 1995**	**Average MFP Growth, 1997 - 2001**
Australia	1.1%	1.5%
Canada	0.2%	1.3%
France	1.7%	1.7%
Germany	1.0%	0.8%
Japan	1.7%	0.4%
United Kingdom	2.2%	0.9%
United States	1.0%	1.1%

As you can see, MFP growth much more closely matches real long-term dividend growth than either labor productivity or real GDP per capita growth.

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So where does this leave us? We began with a model that estimated future equity market returns as the sum of the current dividend yield plus expected long term dividend growth. We have now shown how it can be implemented. This yields the following estimates of future equity market returns, which we compare to those provided by the current market earnings yield method. The first set of estimates makes no adjustment for share repurchases, and assumes 1.0% long-term growth in multifactor productivity.

Region	**Dividend Yield**	**Dividend Growth (MFP Growth)**	**Expected Equity Market Real Return**
Australia	3.9%	1.0%	4.9%
Canada	1.8%	1.0%	2.8%
Eurozone	2.9%	1.0%	3.9%
Japan	1.2%	1.0%	2.2%
United Kingdom	3.3%	1.0%	4.3%
United States	1.8%	1.0%	2.8%

This next set of estimates adds .5% to the dividend yield to account for net repurchases, and raises multifactor productivity growth to a sustained rate of 2.0% per year.

Region	**Adjusted Dividend Yield**	**Dividend Growth (MFP Growth)**	**Expected Equity Market Real Return**
Australia	4.4%	2.0%	6.4%
Canada	2.3%	2.0%	4.3%
Eurozone	3.4%	2.0%	5.4%
Japan	1.7%	2.0%	3.7%
United Kingdom	3.8%	2.0%	5.8%
United States	2.3%	2.0%	4.3%

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So far, we have addressed the future real returns equity markets might be expected to supply. We now turn to the question as to whether these are also the returns that investors require, and what might happen if they are not.

In theory, the real rate of return investors demand from the equity market is equal to the current yield on a long-term risk free real return bond, plus an additional "equity market risk premium" that compensates them for the additional risk born by people who invest in stocks. The former is readily available from the daily newspaper; the real question pertains to the equity market risk premium. If you believe that equity markets are highly efficient, the rate of return that equities are expected to supply will always equal the return that investors demand.

We have concluded that the weight of recent research suggests that this is not an accurate description of reality. We reviewed this evidence at length in our February, 2004 article, "Has the Death of Efficient Markets Killed Indexing Too?" Since then, other research has been published that reaches the same conclusion. One of these is "A Study of Neo-Austrian Economics Using an Artificial Stock Market", by Benink, Gordillo, Pardo, and Stephens. As originally proposed by Friedrich Hayek, the authors note that "markets are continuously evolving from one inefficiency to another, never attaining perfect, efficient equilibrium, yet strongly attracted to it." In this environment, the authors describe how "creative investors track and exploit profit opportunities generated by continuous information shocks [e.g., the introduction of new information into the market] in a never ending cycle…[However], these investors' actions produce signals to other investors, triggering actions that reduce the market's disequilibrium" and move it back towards efficiency. The authors note that while "short term regularities" (that imply predictability) can emerge in this system, they are transitory.

More recently, in his paper "Reconciling Efficient Markets With Behavioral Finance: The Adaptive Markets Hypothesis", Andrew Lo from the Massachusetts Institute of Technology starts with the following assumptions: "(1) Individuals act in their own self interest, make mistakes, and gradually learn and adapt; and (2) Competition drives adaptation, as well as selection pressures [e.g., the exit of the least successful investors from the market, and the flow of assets to the most successful managers]. Lo notes that the key insight of his model, "taken directly from evolutionary biology, is that convergence to equilibrium [i.e.,

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efficiency] is neither guaranteed nor likely to occur at any point in time. The notion that evolving systems must march inexorably towards some ideal stationary state is just plain wrong."

Assuming that markets are not perfectly efficient and continuously in equilibrium, it follows that there could be situations in which the rate of return that an equity market is expected to supply is greater or lesser than the rate of return demanded by investors. Under these circumstances, the most logical adjustment mechanism is equity prices. If the expected supply of equity returns is less than the rate demanded by investors, prices should fall (which would cause a rise in the dividend/price ratio). If the expected supply of equity returns is greater than the rate demanded by investors, prices should rise, causing the dividend yield to fall.

So, with this in mind, let us now take a more in-depth view of the real rate of return that investors should demand on their investment in a broad equity market index. As previously noted, this return is composed of two parts: the yield on real return government bonds, and an equity market risk premium.

While the current real bond return can be obtained from the paper, there is an issue as to whether this is the correct one to use. The real risk free rate of interest is one of the most important yet least understood variables in all finance and economics. It plays a critical role not only in investments (as the foundation upon which bond yield curves and required equity market returns are built), but also in monetary policy, where the gap between the normal (or, "natural") and actual real risk free rate is an important indicator (see, for example, "The Real Interest Rate Gap as an Inflation Indicator" by Neiss and Nelson, "Measuring the Natural Rate of Interest" by Laubach and Williams, and "The Real Interest Rate and Monetary Policy" by Magnus Jonsson).

In theory, the normal risk free rate is a function of three factors. The first is investors' time preference – that is, the return they require to forego consumption today (by saving) in order to consume more in the future. The more impatient ("I want it now!") people are, the higher the rate of interest they will require to defer current consumption. While usually roughly estimated at between 1% and 3%, this rate tends not to be constant, varying not only between different situations, but also over time (see, for example, "Valuing the Future" by Pearce, Groom, Hepburn, and Koundouri, "Discount Rates for Time Versus Dates" by Robyn

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LeBoeuf; "Time Discounting and Time Preference" by Frederick, Loewenstein, and O'Donoghue; and "Lifecycle Changes in the Rate of Time Preference" by David Bishai).

The second factor that contributes to the real risk free rate is the rate at which productivity (generally taken to mean MFP) is increasing in the economy. As this increases, so too does the productivity of capital, and the rate of return companies can pay to people to induce them to save more (and thereby provide the funds needed for new business investments).

The third factor that drives the risk free rate is investors' average degree of risk aversion. As this increases, people hold larger precautionary savings. All else being equal, this increase in savings will tend to reduce real interest rates.

Mathematically, the simple formula for the natural risk free rate of interest (there are more complicated ones) equals (Time Discount Rate + MFP Growth Rate) x (1/Risk Aversion Factor). So, for example, a Time Discount Rate of 2%, expected MFP Growth of 1.5%, and a Risk Aversion Factor of 2 (technically, that's Constant Relative Risk Aversion) results in a real risk free rate of 1.75% -- not that different from the current 1.62% on risk free real return bonds in the United States.

However, the current real rate is low by historical standards; between 1963 and 2003, it averaged 2.9%. What might account for this? Since the Risk Aversion Factor we assume is already low, the change must have been in the other two factors. For example, if we assume more impatient consumers (say, a Time Discount Rate of 3%), and a higher expected rate of MFP growth (say, 2.5%), we get a real risk free rate of 2.75%.

However, since both the variables in this model and their estimated values are still somewhat controversial, we have decided to use the current yield on real return government bonds in our valuation methodology. Today, those yields are as follows:

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Region	Current Real Bond Yield
Australia	2.60%
Canada	1.79%
Eurozone	1.36%
Japan	0.29%
United Kingdom	1.63%
United States	1.62%

Let's now move on to one of the most contentious issues in finance, the debate over the "right" equity risk premium to use. Traditionally, the most common approach to estimating the equity risk premium was to look at average historical rates of return on equity and government bonds, and use the difference between them as the equity risk premium. The following table contains historical estimates of equity risk premia, from the Global Investment Returns Yearbook by Dimson, Marsh and Staunton:

Country or Region	1900 – 2000 ERP Estimate*
Australia	6.2%
Canada	4.1%
France	3.7%
Germany	5.2%
Japan	5.6%
United Kingdom	4.0%
United States	4.6%
World Index	4.0%

* Geometric Average

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However, in recent years the historical approach to estimating the equity risk premium (ERP) has been questioned by many respected academic researchers. They have concluded that there is often a big difference between the returns people reasonably expect to receive when they make an investment (the "ex-ante" ERP), and the returns they actually receive (the "ex-post" ERP). In other words, historical, or realized rates of return on equities (and the difference between these returns and the returns on government bonds) may be very poor estimates of what people actually were thinking when they made these investments. These doubts have been reflected in a large number of academic papers. The following table presents the key conclusions from a number of these studies:

Study and Authors	**Equity Risk Premium Estimate (Over Bonds)**
Merrill Lynch Survey of Fund Managers, May, 2002	3.8% for world ERP
"Estimating the Equity Risk Premium", by O'Hanlon and Steele	4% to 5% in U.K.
"The Shrinking Equity Premium" by Jeremy Siegel	1.5% to 2.5% in U.S.
"An Ex-Ante Examination of the Equity Premium" by Glen Donaldson et al	3.5% in U.S.
"New Estimates of the Equity Risk Premium" by Douglas Lamdin	3.1% in U.S.
"The Declining U.S. Equity Premium" by Ravi Jagannathan et al	0.7% after 1970 in U.S.
"The Equity Premium" by Eugene Fama and Kenneth French	2.55% for 1951 to 2000 in U.S.
"What Risk Premium is Normal?" by Robert Arnott and Peter Bernstein	2.4% in U.S. from 1810 to 2001

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Study and Authors	**Equity Risk Premium Estimate (Over Bonds)**
"Estimating the Market Risk Premium" by Scott Mayfield (a very impressive study that relates the equity risk premium to market volatility, using a regime switching model)	4.1% in U.S.
2005 Global Investment Returns Yearbook, by Dimson, Marsh and Staunton	5% over Short Term Government Debt (roughly 3.5% over bonds)
"The Market Equity Risk Premium" a very comprehensive review of multiple studies published in May, 2005 by the New Zealand Treasury	3% to 5% range; 4% estimate.

As you can see, the majority of these studies find that the forward looking equity risk premium should be lower than realized historical excess returns over real return bonds. There is, however, a dissenting view. In two recently published papers ("A Unified Bayesian Theory of Equity 'Puzzles"" by Martin Weitzman, and "A Bayesian Solution to the Equity Premium Puzzle" by Jobert, Platania, and Rogers), the authors start with a mystery: why has the historical volatility of equity market returns (and excess returns over real return bonds) been so much higher than the underlying volatility in the real growth rate of the economy or personal consumption spending? They conclude that, when investor uncertainty about the equity returns generating process is taken into account (as evidenced by our previous discussion), the historical equity market premium is in line with reasonable investor expectations.

In addition, studies have found that the expected equity risk premium tends to rise and fall over time, decreasing when a string of recent market gains reduces people's perception of risk, but rising again when recent market losses brings equities' relative riskiness back into focus. However, as Goyal and Welch conclude in their paper, "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction", there appears to be no reliable indicator that can be used to predict in advance these apparent changes in investors' average equity risk premium.

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Given this range of views, we have decided to use two different estimates of the Equity Risk Premium: 2.5% and 4.0%.

This brings us to our revised equity market valuation update, which we will use from now on. It will continue to be based on a comparison between the future real returns the equity market is expected to supply, and the real return on equity that investors demand. Our approach is based on what is known as either the Dividend Discount Model or the Gordon Growth Model. This says that the fair value of an equity is equal to the present value of the dividend it pays (technically, the present value of the dividend in the next period), discounted at the required rate of return (the real bond yield plus the equity risk premium) less than expected dividend growth rate.

We set the current value of each equity market equal to 100. We then use the Dividend Discount Model to estimate the fair value of the equity market. We do this using different combinations of our high and low scenarios for the future supply of return, and our high and low scenarios for investors required rate of return. We divide 100 by the result of each of these calculations. If this ratio is less than 100, our valuation estimate suggests (but, given the uncertainty in the variable input values does not conclusively prove) that the equity market is undervalued. If the ratio is greater than 100, it suggests that the market is overvalued.

For example, consider one possible scenario for Australia. One of its assumptions is that the equity market will supply relatively high returns in the future. In this case, the current dividend yield of 3.9% is adjusted upwards by .5% to account for future share repurchases. Future multifactor productivity growth is assumed to be 2.0% per year. The average annual return equity market is expected to supply is therefore 6.4%. Another assumption under this scenario is that equity market investors will demand relatively high returns. In this case, a 4% equity market risk premium is added to the current real bond yield of 2.60% to arrive at our estimated required rate of return of 6.60%. As you can see, the required rate of return exceeds the rate the market is expected to supply by .20%. This translates into a 4% overvaluation, which is expressed as 104% in the table below.

Here are the complete results of our new equity market valuation estimates:

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Australia	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	70%	104%
Low Supplied Return	105%	144%

Canada	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	97%	160%
Low Supplied Return	178%	259%

Eurozone	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	53%	96%
Low Supplied Return	96%	147%

Japan	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	47%	136%
Low Supplied Return	154%	284%

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United Kingdom	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	55%	93%
Low Supplied Return	94%	139%

United States	**Low Demanded Return**	**High Demanded Return**
High Supplied Return	92%	158%
Low Supplied Return	176%	261%

The conclusion of this analysis is obvious, if painful. Under most assumptions about the future supply of equity returns and the returns investors demand, many equity markets appear overvalued today. Only if one assumes a sharp and sustained increase in future multifactor productivity growth to 2.0% per year, and a sustained equity risk premium of 2.5% is this not the case. However, a final word of caution about this conclusion is also in order. Clearly, the Dividend Discount Model is not the only one that could be used to estimate the fair value of an equity market. Moreover, while it has the virtue of simplicity, it is not without its flaws. For example, it is a steady state model, that does not attempt to adjust for short-term business cycle effects. Last but not least, in addition to model uncertainty, our conclusions are also inevitably affected by estimation errors in the model's four key variables. Therefore, while they are certainly indicative, our valuation conclusions can never be conclusive on the question of whether equity markets are fairly valued today.

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Model Portfolios Update

We produce three different types of model portfolios. Each of these is based on a different portfolio construction methodology.

We use a "rule of thumb" approach (or, to use the more formal term, a "heuristic approach") to construct our benchmark portfolios. More specifically, we use three "rules of thumb" that are often cited in news stories a mix of 80% equities and 20% debt (for our high risk/high return portfolios); a mix of 60% equities and 40% debt (for our moderate risk/moderate return portfolios); and a mix of 20% equities and 80% debt (for our low risk/low return portfolios). Using different terminology, somebody else might call these three portfolios aggressive, balanced, and conservative. We implement these three rules of thumb in two different ways (to construct six different benchmark portfolios). The first uses just two asset classes: domestic investment grade bonds and domestic equity. The second uses a broader mix of asset classes: domestic and foreign investment grade bonds, and domestic and foreign (including emerging market) equity. In addition to these 80/20, 60/40, and 20/80 portfolios, we also provide our "couch potato" portfolio. This portfolio is equally allocated to all of the asset classes we use. More formally, this is known as the "1/N heuristic," which research has shown is an approach used by a significant proportion of retirement plan investors. This portfolio implicitly assumes that it is impossible to accurately forecast future asset class risk and return; consequently, the best approach is to equally divide one's exposure to different sources of return (and risk). While we disagree with this assumption, intellectual honesty compels us to include the "couch potato" portfolio as one of our benchmarks. Finally, each year we also benchmark all our portfolios against the return from holding cash. We define this return as the yield to maturity on a one-year government security purchased at the end of the previous year. For 2005, the U.S. cash benchmark return is 2.75% (nominal).

The goal of our second set of model portfolios is to either deliver more return than the domestic benchmark portfolios, while taking on no more risk, or to deliver the same level of return while taking on less risk. To develop these model portfolios, we use a methodology known as "mean/variance optimization" or MVO. This approach uses three variables for each asset class (its expected return, standard deviation of returns, and correlation of returns with other asset classes) to construct different combinations of portfolios which maximize return

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per unit of risk (another way of looking at this is that they minimize risk per unit of return). The MVO technique has some significant limitations. While it is a good approach to single year portfolio optimization problems, in multiyear settings it fails to adequately take into account the fact that poor portfolio performance in early years can substantially reduce the probability of achieving long term goals. It also fails to adequately account for most people's intuitive understanding of risk: what's important isn't standard deviation (the dispersion of annual returns around their mean), but rather the chance that I will fall short of my long-term goals. Given these limitations, our MVO portfolios are most appropriate for managers whose performance is evaluated on an annual basis in comparison to one of our benchmarks.

Our third set of model portfolios uses a simulation optimization methodology. It assumes that an investor understands the long-term compound real rate of return he or she needs to earn on his or her portfolio to achieve his or her long-term financial goals. We use SO to develop a multi-period asset allocation solutions that are “robust”. They are intended to maximize the probability of achieving an investor’s compound annual return target under a wide range of possible future asset class return scenarios. More information about the SO methodology is available on our website. Using this approach, we produce model portfolios for three different compound annual real return targets: 7%, 5%, and 3%. We produce two sets of these portfolios: one includes hedge funds as a possible asset class, and one does not.

The year-to-date results for all these model portfolios are shown in the tables on the following pages.

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Model Portfolios Year-to-Date Performance

These portfolios seek to maximize return while matching their benchmark's risk (standard deviation)			
	YTD 31May05	**Weight**	**Weighted Return**
	In U.S. $		In U.S. $
High Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-1.1%	**80%**	**-0.88%**
U.S.Bonds	1.9%	**20%**	**0.38%**
		100%	**-0.50%**
Global Benchmark			
U.S. Equity	-1.1%	**40%**	**-0.44%**
Non-U.S. Equity	-2.1%	**40%**	**-0.84%**
U.S. Bonds	1.9%	**10%**	**0.19%**
Non-U.S. Bonds	-4.4%	**10%**	**-0.44%**
		100%	**-1.53%**
Recommended			
U.S. Equity	-1.1%	**55%**	**-0.61%**
Foreign Equity (EAFE)	-2.5%	**25%**	**-0.63%**
Emerging Mkts Equity	1.8%	**7%**	**0.13%**
Commercial Property	1.2%	**3%**	**0.04%**
Commodities	5.9%	**10%**	**0.59%**
		100%	**-0.48%**

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These portfolios seek to maximize return while matching their benchmark's risk (standard deviation)			
Medium Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-1.1%	**60%**	**-0.660%**
U.S.Bonds	1.9%	**40%**	**0.760%**
		100%	**0.100%**
Global Benchmark			
U.S. Equity	-1.1%	**30%**	**-0.33%**
Non-U.S. Equity	-2.1%	**30%**	**-0.63%**
U.S. Bonds	1.9%	**20%**	**0.38%**
Non-U.S. Bonds	-4.4%	**20%**	**-0.88%**
		100%	**-1.46%**
Recommended			
U.S. Equity	-1.1%	**47%**	**-0.52%**
Foreign Equity (EAFE)	-2.5%	**10%**	**-0.25%**
U.S.Bonds	1.9%	**12%**	**0.23%**
U.S. High Yield Bonds	-0.4%	**5%**	**-0.02%**
Non-U.S. Bonds	-4.4%	**5%**	**-0.22%**
Commercial Property	1.2%	**6%**	**0.07%**
Emerging Mkts Equity	1.8%	**5%**	**0.09%**
Commodities	5.9%	**10%**	**0.59%**
		100%	**-0.03%**

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These portfolios seek to maximize return while matching their benchmark's risk (standard deviation)			
Low Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-1.1%	**20%**	**-0.22%**
U.S.Bonds	1.9%	**80%**	**1.52%**
		100%	**1.30%**
Global Benchmark			
U.S. Equity	-1.1%	**10%**	**-0.11%**
Non-U.S. Equity	-2.1%	**10%**	**-0.21%**
U.S. Bonds	1.9%	**40%**	**0.76%**
Non-U.S. Bonds	-4.4%	**40%**	**-1.76%**
		100%	**-1.32%**
Recommended			
U.S. Equity	-1.1%	**16%**	**-0.18%**
U.S. Bonds	1.9%	**55%**	**1.05%**
U.S. High Yield Bonds	-0.4%	**3%**	**-0.01%**
Real Return Bonds	2.2%	**10%**	**0.22%**
Commercial Property	1.2%	**5%**	**0.06%**
Foreign Equity (EAFE)	-2.5%	**6%**	**-0.15%**
Commodities	5.9%	**5%**	**0.30%**
		100%	**1.28%**

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These portfolios seek to minimize risk while matching their benchmark's returns.			
	YTD 31May05	**Weight**	**Weighted Return**
	In U.S. $		In U.S. $
High Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-1.1%	**80%**	**-0.88%**
U.S.Bonds	1.9%	**20%**	**0.38%**
		100%	**-0.50%**
Global Benchmark			
U.S. Equity	-1.1%	**40%**	**-0.44%**
Non-U.S. Equity	-2.1%	**40%**	**-0.84%**
U.S. Bonds	1.9%	**10%**	**0.19%**
Non-U.S. Bonds	-4.4%	**10%**	**-0.44%**
		100%	**-1.53%**
Recommended			
U.S. Bonds	1.9%	**5%**	**0.10%**
Commercial Property	1.2%	**10%**	**0.12%**
U.S. Equity	-1.1%	**58%**	**-0.64%**
Foreign Equity (EAFE)	-2.5%	**17%**	**-0.43%**
Commodities	5.9%	**10%**	**0.59%**
		100%	**-0.26%**

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These portfolios seek to minimize risk while matching their benchmark's returns.			
Medium Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-1.1%	**60%**	**-0.66%**
U.S.Bonds	1.9%	**40%**	**0.76%**
		100%	**0.10%**
Global Benchmark			
U.S. Equity	-1.1%	**30%**	**-0.33%**
Non-U.S. Equity	-2.1%	**30%**	**-0.63%**
U.S. Bonds	1.9%	**20%**	**0.38%**
Non-U.S. Bonds	-4.4%	**20%**	**-0.88%**
		100%	**-1.46%**
Recommended			
U.S. Equity	-1.1%	**45%**	**-0.50%**
Foreign Equity (EAFE)	-2.5%	**10%**	**-0.25%**
U.S. Bonds	1.9%	**29%**	**0.55%**
U.S. High Yield Bonds	-0.4%	**5%**	**-0.02%**
Commercial Property	1.2%	**6%**	**0.07%**
Commodities	5.9%	**5%**	**0.30%**
		100%	**0.15%**

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Low Risk/Return Portfolio			
Asset Classes			
U.S. Benchmark			
U.S. Equity	-1.1%	**20%**	**-0.22%**
U.S.Bonds	1.9%	**80%**	**1.52%**
		100%	**1.30%**
Global Benchmark			
U.S. Equity	-1.1%	**10%**	**-0.11%**
Non-U.S. Equity	-2.1%	**10%**	**-0.21%**
U.S. Bonds	1.9%	**40%**	**0.76%**
Non-U.S. Bonds	-4.4%	**40%**	**-1.76%**
		100%	**-1.32%**
Recommended			
U.S. Equity	-1.1%	**10%**	**-0.11%**
Foreign Equity (EAFE)	-2.5%	**8%**	**-0.20%**
Commercial Property	1.2%	**4%**	**0.05%**
U.S.Bonds	1.9%	**40%**	**0.76%**
Real Return Bonds	2.2%	**25%**	**0.55%**
U.S. High Yield Bonds	-0.4%	**8%**	**-0.03%**
Commodities	5.9%	**5%**	**0.30%**
		100%	**1.31%**

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These portfolios seek to maximize the probability of achieving at least the target real return over twenty years, at the lowest possible risk.			
	YTD 31May05	**Weight**	**Weighted Return**
	In US$		In US$
7% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	3%	**0.07%**
U.S. Bonds	1.9%	3%	**0.06%**
Non-U.S. Bonds	-4.4%	29%	**-1.28%**
Commercial Property	1.2%	10%	**0.12%**
Commodities	5.9%	13%	**0.77%**
U.S. Equity	-1.1%	25%	**-0.28%**
Foreign Equity (EAFE)	-2.5%	0%	**0.00%**
Emerging Mkt. Equity	1.8%	17%	**0.31%**
Hedge Funds	-1.1%	0%	**0.00%**
		100%	**-0.24%**
	YTD 31May05	**Weight**	**Weighted Return**
	In US$		In US$
5% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	2%	**0.04%**
U.S. Bonds	1.9%	15%	**0.29%**
Non-U.S. Bonds	-4.4%	22%	**-0.97%**
Commercial Property	1.2%	13%	**0.16%**
Commodities	5.9%	6%	**0.35%**
U.S. Equity	-1.1%	27%	**-0.30%**
Foreign Equity (EAFE)	-2.5%	5%	**-0.13%**
Emerging Mkt. Equity	1.8%	10%	**0.18%**
Hedge Funds	-1.1%	0%	**0.00%**
		100%	**-0.37%**

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	YTD 31May05	Weight	Weighted Return
	In US$		In US$
3% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	40%	**0.88%**
U.S. Bonds	1.9%	25%	**0.48%**
Non-U.S. Bonds	-4.4%	8%	**-0.35%**
Commercial Property	1.2%	8%	**0.10%**
Commodities	5.9%	7%	**0.41%**
U.S. Equity	-1.1%	7%	**-0.08%**
Foreign Equity (EAFE)	-2.5%	3%	**-0.08%**
Emerging Mkt. Equity	1.8%	2%	**0.04%**
Hedge Funds	-1.1%	0%	**0.00%**
		100%	**1.40%**

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These portfolios seek to maximize the probability of achieving at least the target real return over twenty years, at the lowest possible risk.		***These portfolios are the same as our other target real return portfolios, except that they can also invest in hedge fund index products.***	
	YTD 31May05	**Weight**	**Weighted Return**
	In US$		In US$
7% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	3%	**0.07%**
U.S. Bonds	1.9%	0%	**0.00%**
Non-U.S. Bonds	-4.4%	27%	**-1.19%**
Commercial Property	1.2%	13%	**0.16%**
Commodities	5.9%	10%	**0.59%**
U.S. Equity	-1.1%	20%	**-0.22%**
Foreign Equity (EAFE)	-2.5%	0%	**0.00%**
Emerging Mkt. Equity	1.8%	12%	**0.22%**
Hedge Funds	-1.1%	15%	**-0.16%**
		100%	**-0.54%**

	YTD 31May05	**Weight**	**Weighted Return**
	In US$		In US$
5% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	5%	**0.11%**
U.S. Bonds	1.9%	20%	**0.38%**
Non-U.S. Bonds	-4.4%	22%	**-0.97%**
Commercial Property	1.2%	7%	**0.08%**
Commodities	5.9%	10%	**0.59%**
U.S. Equity	-1.1%	20%	**-0.22%**
Foreign Equity (EAFE)	-2.5%	0%	**0.00%**
Emerging Mkt. Equity	1.8%	6%	**0.11%**
Hedge Funds	-1.1%	10%	**-0.11%**
		100%	**-0.02%**

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	YTD 31May05	Weight	Weighted Return
	In US$		In US$
3% Target Real Return	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	42%	**0.92%**
U.S. Bonds	1.9%	16%	**0.30%**
Non-U.S. Bonds	-4.4%	11%	**-0.48%**
Commercial Property	1.2%	10%	**0.12%**
Commodities	5.9%	7%	**0.41%**
U.S. Equity	-1.1%	7%	**-0.08%**
Foreign Equity (EAFE)	-2.5%	2%	**-0.05%**
Emerging Mkt. Equity	1.8%	2%	**0.04%**
Hedge Funds	-1.1%	3%	**-0.03%**
		100%	**1.15%**

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	YTD 31May05	Weight	Weighted Return
	In US$		In US$
Equally Weighted Portfolio	*YTD Returns are Nominal*		
Asset Classes			
Real Return Bonds	2.2%	12.5%	**0.28%**
U.S. Bonds	1.9%	12.5%	**0.24%**
Non-U.S. Bonds	-4.4%	12.5%	**-0.55%**
Commercial Property	1.2%	12.5%	**0.15%**
Commodities	5.9%	12.5%	**0.74%**
U.S. Equity	-1.1%	12.5%	**-0.14%**
Foreign Equity (EAFE)	-2.5%	12.5%	**-0.31%**
Emerging Mkt. Equity	1.8%	12.5%	**0.23%**
		100.0%	**0.63%**

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