

C A M B R I D G E A S S O C I A T E S L L C

GLOBAL INFLATION HEDGING

2004

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ABSTRACT

1. Why should investors hedge against inflation? First, during periods of high and unexpected inflation, investors with spending liabilities could be forced to sell equities at depressed prices to sustain spending, thus undermining their portfolio's ability to recover. Second, few investors can tolerate a prolonged and substantial decline in the value of their assets, even if they are not dependent on those assets to support spending needs.
2. Unfortunately, there is no perfect inflation hedge and the competing objectives of an inflation-hedging strategy—preserving purchasing power through asset price appreciation, while simultaneously providing adequate cash flow to handle spending needs—make designing an effective hedge all the more difficult. However, investors looking to hedge against inflation have typically considered hard assets such as equity real estate, energy reserves, timber, commodities, and gold, as well as asset-based equities such as REITs, energy, or mining stocks. While each of these assets has the potential to hedge inflationary shocks, they pose challenges in terms of prices influenced by supply and demand factors, opportunity costs, and the relative illiquidity of many hard asset investment vehicles. Furthermore, investors must also take into account both currency issues and cross-border investment limitations, such as tax and other investment constraints, that may impede their participation in the most promising direct investment opportunities.
3. Investors looking to implement an inflation-hedging strategy should keep three things in mind. First, it is imperative to choose assets that have the potential to provide outsized returns during a spike in inflation. While conclusive data are limited, such data as are available tend to confirm the conclusions one would reach simply by considering the fundamental, economic basis of return of these asset classes. Second, some investors may need to keep an eye on their liquidity needs vis-à-vis their spending. Finally, opportunity costs: assets that perform very poorly during periods of falling or stable inflation may inflict such a drag on total portfolio performance that even spectacular returns during an inflationary spike may be inadequate to make up the difference.
4. Inflation-indexed (I/I) bonds provide a logical foundation for a portfolio of inflation-hedging assets, as they are designed to provide investors with a constant real return. Further, due to the large and rapidly growing global market for I/I bonds, the asset class does not suffer from the problem of illiquidity associated with other inflation-hedging strategies. The main drawback is that I/I bond prices are driven not only by prevailing inflation rates, but also by shifts in real interest rates. Since we lack sufficient historical data to determine how real interest rates would respond during an inflationary shock, we cannot predict with confidence how I/I bonds would perform during such a period.
5. Data on real estate's inflation-hedging credentials are also inconclusive. Although rents are likely to rise in tandem with the cost of new construction, which should in turn reflect prevailing rates of inflation, supply-demand issues, liquidity concerns for private investments, and political constraints on market access can all serve as investment impediments. Nevertheless, real estate does have the advantage of

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producing significant cash flow that is generally quite stable in real terms as long as supply and demand are balanced. This large income component of return should cushion the impact of a stock or bond market decline and provide a source of revenue for annual distributions.

6. Oil and natural gas prices tend to exhibit positive or neutral correlations with inflation, especially during times of high inflation. Moreover, a recent study by Ibbotson Associates shows that direct energy investments diversify portfolios (far better than do publicly traded energy stocks) without sacrificing expected return. As is the case with most private investments, however, oil and gas partnerships require long-term capital commitments, and there are few experienced advisors. These concerns are magnified for non-U.S. investors, who may not have access to U.S.-based groups that have historically provided the strongest returns and tend to see the most promising deals.
7. A long-only, diversified basket of fully collateralized commodity contracts has historically proven to be a reliable hedge against inflation and a powerful diversifier for most portfolios. Indeed, for investors willing to stomach the volatility, commodities are likely to provide solid protection during an inflationary shock without unduly sacrificing return during periods in which inflation remains subdued. Commodities' resiliency is due in large part to the fractured nature of the returns, which are a function of three components: the change in spot prices, the "roll yield" that results from differences between the spot price and the futures contract price, and the interest earned on the assets posted as collateral. Unfortunately, European regulations virtually preclude commodities ownership for nonprofits and tax-exempt funds, as they consider commodities trading vehicles rather than investments, and therefore subject to tax. While some commodities managers are looking into different account structures as a possible solution, this presents a serious and perhaps intractable obstacle for certain European investors.
8. Timber should provide a very effective hedge in times of high inflation: select timberland investment products have the potential to generate real rates of return of 6% to 10% over a full investment cycle. Much of this is due to the fact that timber is a relatively inefficient asset class in which managers create value by purchasing land at favorable prices and by marketing logs more efficiently for price premiums. In addition, timber prices tend to be relatively stable as there are few ways to speed up the tree-growing and cutting process. As with other direct investments, however, non-U.S. investors may find it difficult to participate in the U.S. manager universe due to tax and other considerations. These are not insurmountable, however; depending on the country, investors may be able to obtain a tax credit to offset their U.S. tax liability. Meanwhile, other countries have significant timber production, including southern hemisphere nations well positioned to serve the growing demand from China and the rest of Asia.
9. Gold is perhaps the ultimate hedge against monetary inflation, as it exhibits elements of both a commodity and a hard currency. As a commodity, gold is likely to appreciate in value along with other real assets, while as a hard currency, gold provides a hedge against the demise or severe impairment of the current fiat monetary system and is favored by those who believe that system is unraveling. In the only recent example of a sustained inflationary environment, gold not only outperformed all other asset classes except oil and natural gas, but also exhibited the highest correlation to inflation. However, these

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positives are offset by the enormous opportunity cost of holding gold: from 1973 through 2003, for example, gold was the worst-performing of the asset classes included in this study.

10. For taxable European (euro-denominated) or U.K. (sterling-denominated) investors seeking to put in place an effective inflation-hedging portfolio without incurring excessive opportunity costs, we would recommend a mixture of I/I bonds, commodities, and timber. For those with access to top-quality managers, private oil and gas investments and private real estate should also be considered, as and when compelling opportunities arise. For nontaxable investors effectively precluded from commodities investments by European regulations, allocations to I/I bonds and timber should be increased, with an eye on shifting assets to commodities if legal restrictions are lifted. In addition, investors with access to top-quality private real estate and oil and gas managers should consider allocations to these sectors.

SUMMARY

Introduction

One of the most important responsibilities for long-term investors is to ensure that investment assets are hedged against the potentially catastrophic consequences of deflation and inflation. This paper will discuss why inflation is a risk, the challenge of hedging inflation's impact on investments, and the various inflation-hedging strategies available to investors, with a particular emphasis on cross-border investments.

Why Inflation is a Risk

Over the very long term, equities have delivered the highest real returns among all financial assets. From 1900 through 2000, for example, global equities generated a 5.8% real average annual compound return (AACR), compared to 1.2% for bonds and about 1% for cash equivalents. Given that equities have performed well over times that include inflationary periods, one might ask why investors should hedge against inflation. There are two reasons. First, investors with spending liabilities could be forced to sell equities at depressed prices in order to sustain spending during a period of high inflation, thus undermining their portfolio's ability to recover. Second, few investors can tolerate a prolonged and substantial decline in the value of their assets, even if they are not dependent on those assets to support spending needs.

Inflation *per se* does not necessarily wreak havoc on equities and bonds, as prices will adjust to moderate fluctuations in inflation during periods of stable economic activity. However, a severe, unexpected rise in the rate of inflation can cause serious dislocations in the financial markets. Chief among the concerns for investors are the following:

- a decline in share prices as production costs rise steeply, hurting margins;
- multiple contraction as investors revise downward real earnings expectations;
- a fall in fixed-rate bond valuations; and
- pressure on spending.

While many investors view deflation as the greater evil, this is true only under moderate circumstances. Under extreme conditions, hyperinflation causes absolute devastation from which there are few places to hide. For example, during the German hyperinflation of the early 1920s, which culminated with an absurd annual inflation rate of 209 billion percent in 1923, the German equity market dropped more than 97% in US\$ terms, and indeed all financial assets rapidly lost value as paper marks headed toward zero.¹ To get a sense of the magnitude of the German experience, consider that the rate of marks to US\$ soared from 20,000 in January 1923 to 630 *billion* by early November. To keep up with the skyrocketing demand for paper currency, 300 paper mills and 150 printing shops with 2,000 presses needed to work

¹ While German equities dropped sharply in US\$ terms during this period, they appreciated substantially when measured in marks, as speculators plowed the rapidly depreciating currency into shares. This is a fairly typical reaction to hyperinflation; in more recent times, Argentine and Brazilian shares have staged massive rallies in local currency terms during periods of extremely high inflation. These are abnormal cases, however, and represent times when investors used equities as a store of wealth in place of rapidly depreciating cash. Under periods of high but not extreme inflation, equities tend to perform quite poorly in local currency terms.

around the clock. Austria, Hungary, Poland, Russia, and several Latin American and African countries have also experienced hyperinflation during the past century.

Among developed nations, the most severe bout of inflation in recent times was that of the United Kingdom during the 1970s when the Retail Prices Index averaged 13.1% a year, peaking in 1975 at nearly 25%. Investment portfolios were clobbered, with U.K. equities posting a real AACR of -1.4%, and U.K. bonds, -4.4%.

While all investors suffer during inflationary periods, not-for-profit institutions may suffer especially severe losses if they attempt to maintain their distribution policies in an effort to offset the higher costs of goods and services incurred by their beneficiaries. In the United States, for example, nonprofits suffered steep losses in the 1970s from which they did not recover until the 1990s. During the fiscal years 1973-81, the average U.S. endowment lost approximately 50% of its value after inflation and spending distributions.

The Challenge of Hedging Inflation's Impact

Recognition of the threat inflation poses to core stock and bond investments has led investors to consider asset allocation strategies that might provide a hedge against inflation-driven shocks. Typically, investors have considered hard assets such as equity real estate, energy reserves, timber, commodities, and gold, as well as asset-based equities such as REITs, energy, or mining stocks. While each of these assets has the potential to hedge inflationary shocks, none can completely mitigate the following three concerns:

1. How each of these assets behaves during an inflationary shock is likely to be highly dependent on the supply/demand balance prevailing at the time. For example, if commercial real estate vacancy rates are high, real estate investments will probably not provide an effective hedge against an inflationary shock.
2. Investors can ill afford to invest in assets likely to perform well only during rare periods of inflationary shock, and so must gauge the opportunity cost of holding such assets over the long term.
3. Most inflation hedges are relatively illiquid. Hence, it may be difficult to realize gains to meet spending requirements or to rebalance the total fund's asset allocation between appreciated inflation-hedging assets and depressed financial assets. An attractive inflation hedge would not only protect the real value of principal invested in an inflationary environment, but would also provide income and/or capital gains that would rise in line with the rate of inflation.

Institutional investors have attempted to mediate these shortcomings in a number of ways. First, they have diversified their allocations to inflation-hedging assets across multiple asset classes, such as real estate, energy, asset-backed equities, commodities, and timber. Second, they have attempted to reflect the supply/demand cycles of each asset in their weightings among these different investments. Finally, they

diversify their illiquid investments by vintage year so that liquidity events are recurring and somewhat predictable in mature portfolios.

When constructing inflation-hedging portfolios, investors should balance competing objectives. On the one hand, an effective inflation hedge should provide very strong returns in the face of rising inflation. On the other hand, the opportunity cost of holding the hedge must not be too high, otherwise it may well be dismantled for underperformance at precisely the wrong time.

In addition, cross-border investors must also take currency fluctuations into account, as shifts in their relative values can negate whatever advantage is gained from the hedge itself. Commodities, for example, appreciated sharply in US\$ terms during 2003, but barely budged when measured in euros. Since commodities are generally priced in US\$, non-U.S. investors must not only select effective inflation hedges, but also be cognizant that returns will be affected by currency movements.² Further, for investors with illiquid cross-border investments, currency hedging can be quite expensive and must be factored in as a drag on total return.

Inflation-Hedging Strategies

Of the inflation-hedging asset classes mentioned above, inflation-indexed (I/I) bonds, real estate, energy, and commodities are the strategies most commonly used by institutions.³ While the available data indicate that these assets satisfy the various inflation-hedging criteria to different degrees, and all carry distinct risk and return characteristics, the institutional investment history for all of these asset classes is quite limited.

Inflation-Indexed Bonds

I/I bonds are designed to provide investors with a constant real return. In order to achieve this, either the principal value of the bond is adjusted for inflation and the coupon rate paid on the adjusted principal, or the coupon itself is adjusted while the principal remains stable. Either way, cash flows increase with the rate of inflation. While there will be a lag between changes in inflation and the adjustment to the cash flows, the bonds should have a high correlation with inflation and offer inflation protection comparable to that of cash equivalent instruments but with potentially higher returns. Further, inflation-linked bonds do not suffer from the problem of illiquidity associated with other inflation-hedging strategies.

² It is important to note that currency risk should be treated as distinct from an inflation-hedging strategy. While a further decline in the US\$ would certainly affect non-U.S. investors who own stakes in US\$-denominated assets, this situation is not unique to inflation-hedging strategies. In other words, the risk of an outbreak of global inflation and the risk of a US\$ decline are separate; while both are possible, investors should not assume one necessitates the other.

³ As a general rule, direct investments provide a far greater inflation hedge than do indirect investments. Commodity-based equities, for example, correlate far better with equity markets than they do with inflation. We have therefore excluded indirect investments from this paper except in certain cases where greater liquidity compensates for the reduced correlation with inflation enough for consideration.

Although the modern market in I/I bonds dates only from their introduction in the United Kingdom in 1981, the global market has grown rapidly in the past few years and now boasts a capitalization in excess of \$415 billion with multiple maturities and currency denominations. Recently, both France and Italy issued euro-denominated I/I bonds of varying maturities, while the United States, Canada, Australia, Sweden, and South Africa also have active markets and Japan, Germany, and Switzerland look set to enter the market in 2004. Indeed, I/I bonds in general continue to gain favor among governments and investors, as the percentage of such bonds issued as a percentage of total government debt continues to rise, and institutional and retail investors alike seem to be warming to the concept of inflation-protected returns.

We would note, however, that the market history is relatively short and covers a period in which inflation was generally falling or relatively stable. In other words, there is no record of inflation-linked bond performance during a period of rising inflation. Logically, I/I bonds would seem the perfect inflation hedge, as they are designed to provide positive returns during inflationary periods and would provide ample liquidity to institutions looking to support spending. The main drawback is that the price of I/I bonds is driven not only by the prevailing rate of inflation but also by the movement of real interest rates. Thus, for example, if a central bank sought to combat rapidly rising inflation by pursuing a policy designed to force real interest rates higher, then the appreciation of I/I bonds resulting from rising inflation might be offset by depreciation resulting from rising real interest rates. Unfortunately, we lack sufficient historical data to determine the probability of such an outcome and so cannot predict with confidence the likely performance of I/I bonds during an inflationary shock.

Despite this uncertainty, we would endorse the view, increasingly common among institutional investors, that I/I bonds provide a logical foundation for a portfolio of inflation-hedging assets.

Real Estate

Real estate is widely considered to be a valid inflation hedge, although the data here are also inconclusive. Reliable returns on private real estate are not available for the 1973-81 time period, so it is difficult to say how such investments have performed during periods of high inflation. While data are available for real estate investment trusts (REITs), such investments are a relatively poor proxy for direct real estate investments. Nevertheless, the results are not encouraging. From 1973-81, the NAREIT Index of U.S. REITs not only exhibited a negative correlation with inflation, but also posted inferior returns to other inflation-hedging asset classes.

The underlying theory for real estate investment is that over time rents will rise in tandem with the cost of new construction, and the cost of new construction should itself rise at roughly the rate of inflation. However, as in any other business, the ability to raise prices over the short term is subject to the cyclical pressures of supply and demand. When supply exceeds demand, rents are constrained even if the costs of land, labor, and materials continue to rise. In addition, investors must take into account factors such as lease structures (i.e., how are rents determined, how often can they be adjusted, are there yearly caps on increases, etc.) and tenant quality (i.e., default risk). Moreover, the private real estate market is highly fragmented; the

market in Europe, for example, is still quite clubby and deals tend to be done on an invitation-only, deal-by-deal basis, which makes it difficult to find a good diversified manager.

An additional impediment to global real estate investing is the political nature of the asset class, which manifests itself in two ways. First, real estate investments may actually become less attractive in periods of very high inflation, as political pressure to cap rents can become intense under such conditions. Second, non-resident investors are often at a severe disadvantage—effectively barred from buying private properties in many markets—as the prospect of “foreigners” buying up land or property tends to instill fear in residents and a sense of righteous indignation in politicians, who respond by passing laws prohibiting or severely restricting such purchases. At the very least, buyers are likely to be subject to additional taxes; for example, the U.S. Foreign Investment in Real Property Tax Act (FIRPTA), imposes discriminatory taxes on gains received by foreign sellers of U.S. capital assets,⁴ while in the United Kingdom, Property Unit Trusts can be tax-inefficient and are not always accessible to non-U.K. investors.

Despite these concerns, real estate does have one very attractive characteristic as an inflation hedge: it produces a significant level of cash flow, which generally should be relatively stable in real terms as long as supply and demand stay in balance. The large income component of return should cushion the impact of a stock or bond market decline and provide a source of revenue for annual distributions.

With regard to REITs, the conversion of many of the premier U.S. private real estate operating companies to public REITs over the last several years has increased the market cap of the sector and created a much more diversified investment pool. REIT structures also exist in France and Holland, with the United Kingdom expected to consider one shortly, and Italy and Spain in the early stages of the process. Germany has no plans to consider a REIT structure anytime soon.

REITs are far from an ideal inflation hedge, however. Indeed, the returns of publicly traded real estate firms are much more highly correlated with the returns of broad equity indices than they are with inflation. Nevertheless, REITs do provide investors with exposure to real estate, as well as predictable cash flows, abundant liquidity, and the ability to easily invest across borders. Some investors consequently include them in their inflation-hedging strategy.

Energy

The oil and gas industry is highly diverse and is commonly divided into four sectors: upstream (oil and gas production activities), midstream (transportation, field processing, and gas gathering), downstream

⁴ In the case of FIRPTA, which applies to virtually all non-U.S. investors regardless of tax status, the impact is far greater on nontaxable entities than on taxable investors. For taxable investors, while FIRPTA makes investments in U.S. real property—including real estate, timber, and oil and gas partnerships—more complex and somewhat more expensive, it generally does not preclude investment provided the investor is willing to pay *some* tax and file forms with the IRS. For nontaxable investors, however, FIRPTA imposes an enormous cost that essentially makes investment in U.S. real property a nonstarter. However, tax laws for cross-border investing in real estate, timber, and oil and gas partnerships are complex and subject to change; we would caution readers that individual tax circumstances can vary greatly and that Cambridge Associates is *not* in the business of providing tax advice. Investors should consult legal and accounting counsel for specific guidance.

(refining, marketing, and distribution), and chemicals. Of these four sectors, the most promising inflation-hedging opportunities are found in the upstream area, which offers both the highest potential returns and the closest correlation to hydrocarbon prices. Companies in the other three sectors are engaged in largely commodity businesses, which are highly correlated with other cyclical, basic industries. The upstream sector includes three major types of participants: integrated oil companies (the “majors”), exploration and production (“E&P” or the “independents”), and oil service and drilling companies.

In contrast to the returns of the broad equity market indices, which are negatively correlated with inflation, oil and natural gas prices tend to exhibit positive or neutral correlations with inflation, especially during periods of high inflation. During the period 1973-81, for example, the correlations of oil and natural gas prices with G7 inflation were 0.23 and 0.10, respectively, versus the -0.25 correlation of the MSCI World Equity Index. (All data are denominated in US\$ unless otherwise noted.) A recent study by Ibbotson Associates, moreover, shows that direct energy investments tend to diversify portfolios without sacrificing expected return. Ibbotson used data from Merit Energy, the American Petroleum Institute, and the U.S. government to construct a backdated series of direct energy investments from 1970; the study found that direct energy tends to have low correlations with financial assets and a positive correlation with inflation, and is a far better diversifier than publicly traded energy stocks.

The advantages of private oil and gas investments, however, are tempered by the illiquidity of the best investment vehicles. As is the case with most private investments, oil and gas investments tend to require long-term capital commitments, and there are a limited number of experienced advisors available. These concerns are magnified for non-U.S. investors, who may not have access to U.S.-based groups that have historically provided the strongest returns and tend to see the most promising deals. Non-U.S. investors, for example, cannot own any interest in a federal land lease (i.e., land owned by the federal government but leased out for uses such as oil and gas exploration), which often precludes investment in U.S. oil and gas partnerships.

Energy-related equities, meanwhile, are a far less attractive inflation hedge, since they have a relatively low correlation to inflation, and even to oil and natural gas prices themselves. Some of this likely has to do with energy companies’ tendency to hedge against fluctuations in energy prices in order to manage their earnings. While this may be a good management strategy (comparable to gold mining companies selling forward their future production), it is likely to frustrate those investors who buy energy-related equities as an inflation hedge. As with real estate, the returns of publicly traded oil and gas companies are far more closely correlated with those of the broad equity markets than they are with inflation.

Commodities⁵

A diversified basket of fully collateralized commodity contracts has historically proven to be a reliable hedge against inflation and a powerful diversifier for most portfolios. Indeed, for investors willing to stomach the volatility of the asset class, commodities are likely to provide solid protection during an inflationary shock without unduly sacrificing return during periods in which inflation remains subdued.

⁵ For more detail on commodities investing, see our 2002 *Commodities* report.

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Commodities' resiliency is due in large part to the fractured nature of returns on the asset class, which are a function of three components: the change in spot prices, the "roll yield" that results from differences between the spot price and the futures contract price, and the collateral yield, which is the interest earned on the assets posted as collateral.

From 1973 through 2003, the Goldman Sachs Commodities Index (GSCI) posted an inflation-adjusted AACR of 5.4% and exhibited a 0.15 correlation with inflation, while also providing a strongly negative correlation with the MSCI World Index. While these are impressive numbers, it is important to remember that much of the return was due to the roll yield and collateral yield, rather than commodity price appreciation. In fact, the GSCI performed worse during the period of high inflation than during the period of low inflation, largely because higher returns from the roll yield offset the absence of any return from spot price changes during the period of low inflation, whereas roll yield return was insignificant during the high-inflation period when spot prices were rising. Still, there are reasons to believe commodities will generate high returns if and when inflation rears its head. During the high-inflation years of 1973-81, the GSCI posted a real AACR of 2.6%, a 0.10 correlation to inflation, and a strongly negative correlation to equity markets. Further, while a 0.10 correlation to inflation is relatively low, it is important to note that commodity prices are a leading rather than a coincident indicator of inflation, with sharp changes in commodity prices flowing through to retail price indices only after a considerable lag. In addition, the direction of inflation is more consequential than its absolute level: commodity index performance has been stronger in periods of increasing inflation (whatever the absolute level) and weaker in periods of decreasing inflation.

Unfortunately, European regulations virtually preclude commodities ownership for nonprofits and tax-exempt funds, as they consider commodities to be trading vehicles rather than investments, and therefore subject to tax. While some commodities managers are looking into different account structures as a possible solution, this presents a serious and perhaps intractable obstacle for certain European investors. Natural resource-related equities do not provide a solution, either, as their returns tend to be more closely correlated with those of equity indices than with either inflation or commodities prices.

As noted above, the two most compelling reasons for investing in a basket of commodities are to provide an inflation hedge and to achieve greater diversification. The inflation-hedge argument is grounded in the fact that commodity futures contracts provide an effective proxy for real economic assets whose value is independent from (but still denominated in) monetary units. As a result, the aggregate performance of the commodity markets tends to be positively correlated with inflation. While the linkage between commodity prices and inflation is significant, it is not perfect. Many of the determinants of the inflation rate are derived from commodity prices, but while changes in oil prices, for example, may be directly translated into corresponding changes in the inflation rate, other components of inflation such as labor costs are less directly linked.

Timber⁶

Timber is a relatively inefficient asset class in which managers create value by purchasing land at favorable prices and by marketing logs more efficiently for price premiums. Although annual current income varies, a range of 2% to 3% (from harvesting and other activities such as hunting leases) is fairly common during the first several years of the investment cycle. During years with heavy harvests, this range is higher. Select timberland investment products have the potential to generate real rates of return of 6% to 10% over a full investment cycle. Although data on timber returns is considered somewhat unreliable, the asset class appears to have been an excellent inflation hedge over the years.⁷

Unlike commodities, whose prices suffer from constant technological advances, timber prices tend to be relatively stable as there are few ways to speed up the tree-growing and cutting process. Furthermore, seemingly simple problems can and do prevent the harvesting of mature, valuable trees. A case in point is Russian timber, which remains largely untouched despite vast forests unprotected or restricted by law from harvesting. Technology, in other words, has been unable to solve the relatively simple problem of access: the majority of Russia's forests are so remote as to render them economically inaccessible.

Much of timber's appreciation in value comes from biological growth and in-growth (as a log grows, there is a step function of per unit value, with each of a larger tree's board feet being more valuable). As a result, the value tends to increase at a steady, somewhat predictable rate, and over time the return of the asset class has experienced low or negative correlation with both inflation and the returns of other portfolio assets.

The less positive issues for prospective timberland investors include the asset class' brief and imprecise long-term institutional investment record, lengthy lock-up period, and the small, inconsistent manager universe. As with other direct investments, non-U.S. investors may find it difficult to participate in the U.S. manager universe due to tax and other considerations. These are not insurmountable issues, however; depending on the country, investors may be able to obtain a tax credit to offset U.S. taxes and thus make the investment more attractive. Meanwhile, other countries with significant timber production include Brazil, Chile, Australia, and New Zealand, the latter two of which, while still relative lightweights in the industry, are well positioned to serve the demand emanating from China and the rest of Asia.⁸

In short, while timber does present more than its share of logistical hurdles, it appears to offer many favorable attributes and should provide a very effective hedge in times of high inflation.

Gold

Gold is perhaps the ultimate hedge against monetary inflation, as it exhibits elements of both a commodity and a hard currency. As a commodity, gold is likely to appreciate in value along with other real

⁶ For more detail on timber, see our 2002 report *Timberland Investing*.

⁷ According to Grantham, Mayo, Van Otterloo & Co., the top quartile of timber returns have historically occurred during periods of higher-than-normal inflation.

⁸ Tax treaties between the relevant countries govern most cross-border timber investments, but do not usually preclude such investments.

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assets, while as a hard currency, gold provides a hedge against a worst-case scenario: the demise or severe impairment of the current fiat monetary system. Furthermore, in the only recent example of a sustained inflationary environment, gold not only outperformed all other asset classes except oil and natural gas prices, but also exhibited the highest correlation to inflation.

Nevertheless, Keynes did not refer to it as the “barbarous relic” for nothing. Gold pays no interest and has no maturity date; indeed, it provides no income whatsoever. Furthermore, despite recent attempts to democratize the gold ownership market, it remains difficult to invest in gold since owners must either pay for storage and insurance costs, or deal with the additional complexities of the futures market.⁹ Perhaps most importantly, the opportunity cost of holding gold can be enormous: from 1982 to 2003, for example, while the MSCI World Equity Index posted a real return of 8.2% a year, gold posted a real AACR of -2.7%. Indeed, from 1973 through 2003, gold was the worst-performing asset class studied, an indication that investment in gold, if attempted at all, should be approached on an opportunistic basis rather than as a permanent portfolio allocation.

Gold-mining companies, meanwhile, have not historically provided nearly as effective an inflation hedge as direct investment, in part due to hedging strategies designed to smooth out fluctuations in the gold price, and also because of a history of poor corporate management. While many mining companies have lately phased out hedging strategies, and management quality has improved since the 1970s, investors looking to benefit from a rise in the gold price should stick to direct investment in the metal itself.

Our view is that gold is an effective hedge against one thing: the debasement of paper currencies by profligate central bankers. In an environment of declining trust in paper money, gold would almost certainly provide blockbuster returns as investors turned to it as a store of wealth. Investors who believe such a scenario is currently unfolding, therefore, may wish to hold a gold position in their portfolios. For others, the opportunity cost of holding gold is probably too much to bear for what is a highly uncertain payoff somewhere down the road.

⁹ The World Gold Council is attempting to solve this problem through the launch of gold exchange-traded funds that are backed by bullion; under the current structure, each share represents one-tenth of an ounce of gold. The shares already trade in Australia and London, and are expected to debut on U.S., Japanese, and Canadian markets shortly, as well as on Euronext.

Conclusion

Unfortunately, there is no perfect inflation hedge. Unlike deflation, which can be easily hedged through an allocation to government bonds, there is no panacea for a worldwide spike in inflation. The competing objectives of an inflation-hedging strategy—preserving purchasing power through asset price appreciation, while simultaneously providing adequate cash flow to handle spending needs—make designing an effective hedge all the more difficult. Furthermore, investors must also take into account both currency issues and cross-border investment limitations, such as tax and other investment constraints, that may impede their participation in the most promising direct investment opportunities.

In addition, periods of high inflation have historically been few and far between; indeed, prior to the current fiat monetary system inflation was generally a temporary phenomenon triggered by wars. The lack of historical precedents makes data analysis problematic, and it is therefore hard to say with certainty which assets will outperform, and to what degree, during an inflationary period.

However, investors looking to implement an inflation-hedging strategy should keep three things in mind. First, it is imperative to choose assets that have the potential to provide outsized returns during a spike in inflation. Although conclusive data may be limited, such data as are available tend to confirm the conclusions one would reach simply by considering the fundamental, economic basis of return of the asset classes covered in this paper. Indeed, all asset classes discussed should provide at least some degree of inflation protection, with commodities, oil and gas, and gold historically providing the greatest degree of inflation protection, albeit with varying degrees of opportunity cost, investibility, and liquidity.

Second, while liquidity is certainly an important consideration, investors should be careful to keep liquidity concerns in perspective relative to spending needs. Most institutions have moved away from holding a large cash position, for example, because liquid cash needs are generally low relative to the size of the overall portfolio. Similarly, most institutions should be able to set aside a few percentage points of capital to illiquid investments such as timber and oil and gas partnerships without endangering their ability to meet year-to-year spending goals.

Finally, investors must take into account the opportunity costs incurred by implementing an inflation-hedging strategy. Assets that perform very poorly during period of falling or stable inflation may inflict such a drag on total portfolio performance that even spectacular returns during an inflationary spike may be inadequate to make up the difference. And, of course, an inflation-hedging portfolio whose returns are negatively correlated with those of conventional financial assets is likely to perform poorly during periods of strong performance by equities and bonds, leading to demands that it be dismantled—probably at precisely the wrong time.

For taxable European (euro-denominated) or U.K. (sterling-denominated) investors seeking to put in place an effective inflation-hedging portfolio without incurring excessive opportunity costs, we would recommend a mixture of I/I bonds, commodities, and timber. For those with access to top-quality managers,

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private oil and gas investments and private real estate should also be considered, as and when compelling opportunities are available.

For nontaxable investors effectively precluded from commodities investments by European regulations, allocations to I/I bonds and timber should be increased, with an eye on shifting assets to commodities if legal restrictions are lifted. In addition, investors with access to top-quality private real estate and oil and gas managers should consider allocations to these sectors.

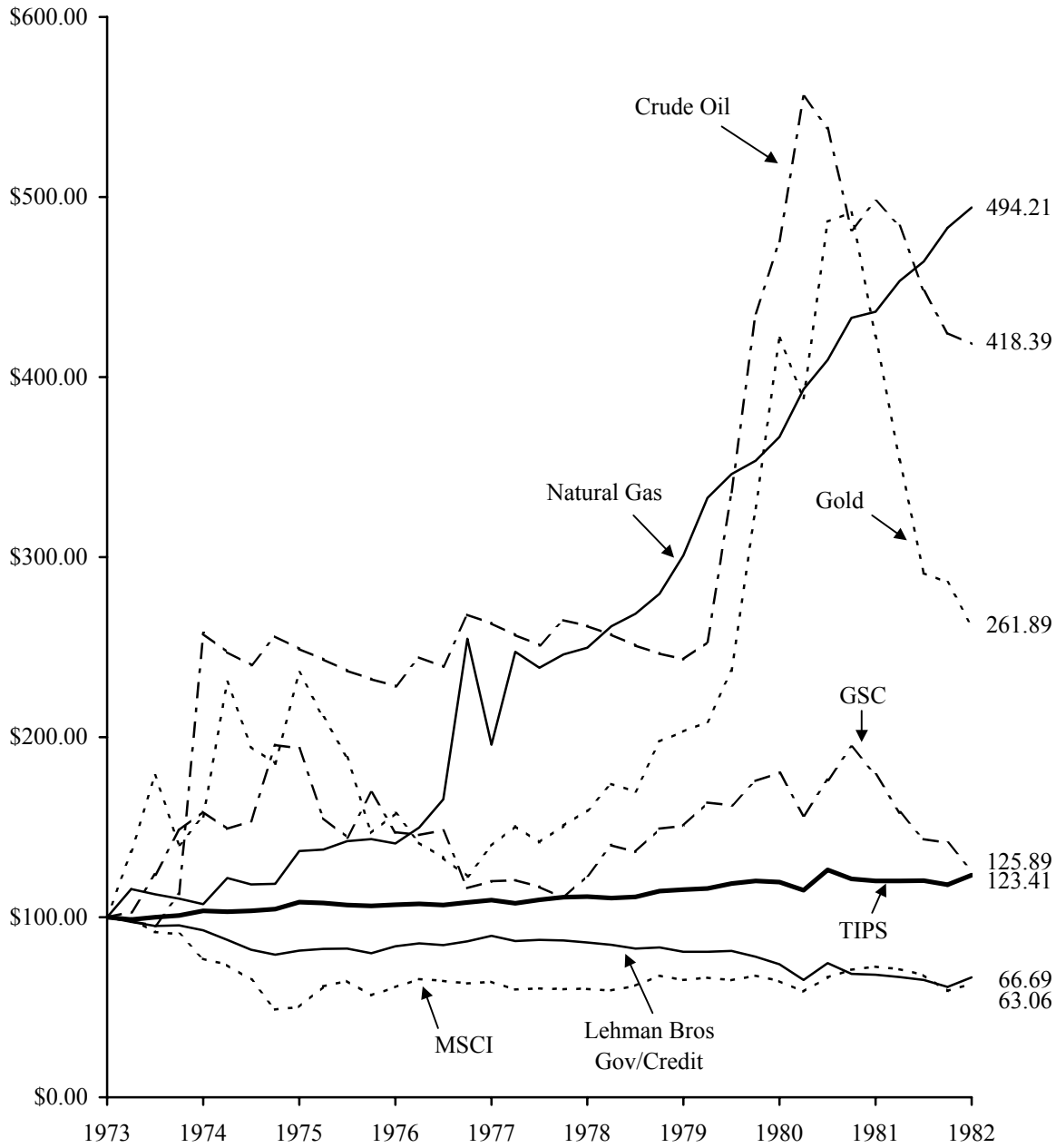
EXHIBITS

Exhibit 1a

INFLATION HEDGES DURING HIGH INFLATION PERIOD

January 1, 1973 - December 31, 1981

Real Cumulative Wealth Index
(December 31, 1972 = \$100)



Sources: Barclays Capital, Thomson Datastream, *The Wall Street Journal*, Bridgewater Associates, and Morgan Stanley Capital International. MSCI data provided "as is" without any express or implied warranties.

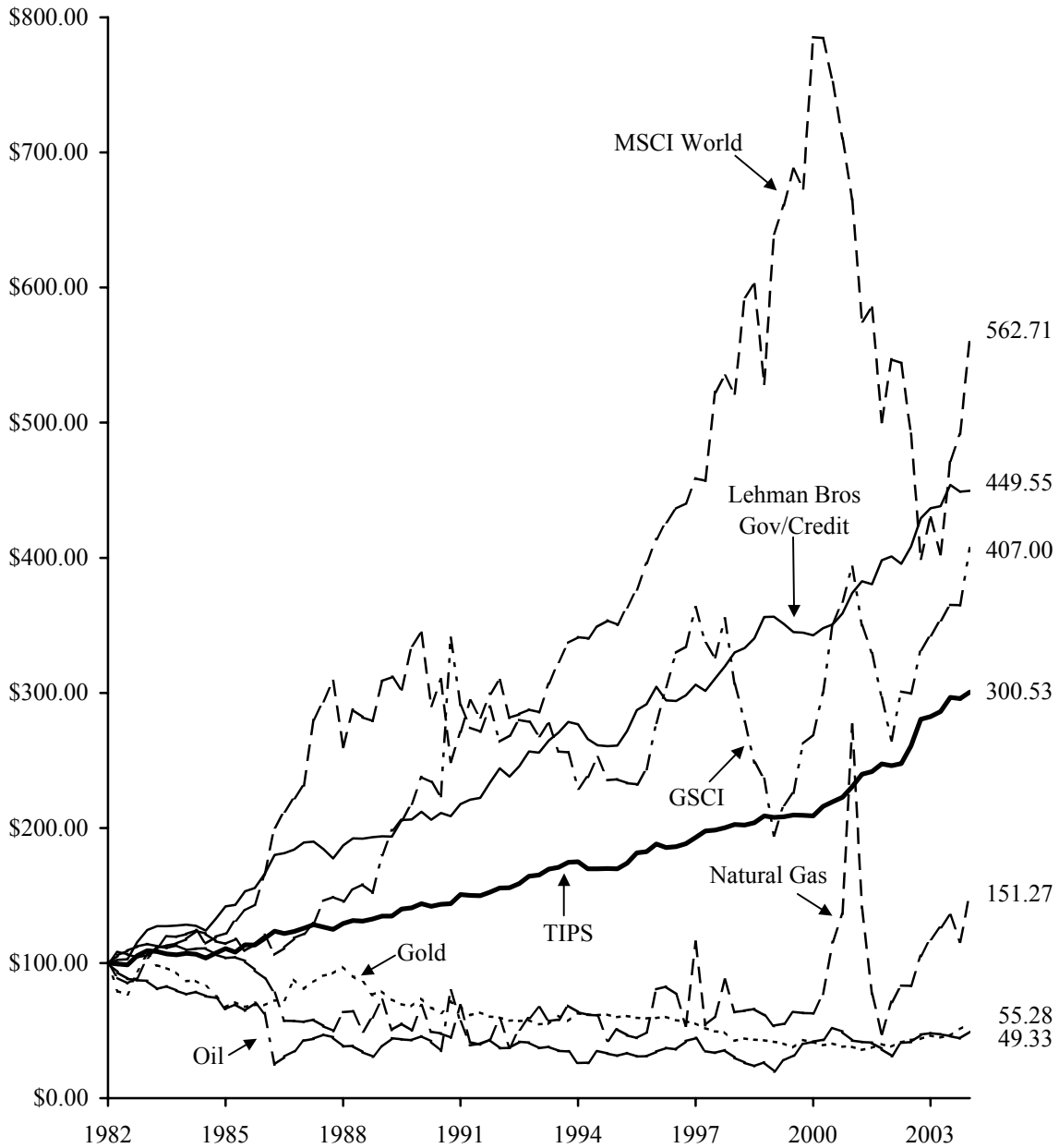
Note: Returns represent real (adjusted for CPI-G7) quarterly data in U.S. dollars.

Exhibit 1b

INFLATION HEDGES DURING LOW INFLATION PERIOD

January 1, 1982 - December 31, 2003

Real Cumulative Wealth Index
(December 31, 1981 = \$100)



Sources: Barclays Capital, Thomson Datastream, *The Wall Street Journal*, Bridgewater Associates, and Morgan Stanley Capital International. MSCI data provided “as is” without any express or implied warranties.

Note: Returns represent real (adjusted for CPI-G7) quarterly data in U.S. dollars.

Exhibit 2

**RETURNS AND CORRELATIONS WITH CPI-G7
DURING HIGH AND LOW INFLATION PERIODS**

	<u>CPI-G7</u>	<u>GSCI</u>	<u>Crude Oil</u>	<u>Natural Gas</u>	<u>Timber Market Portfolio</u>	<u>Gold</u>	<u>NAREIT</u>	<u>MSCI World</u>	<u>Barclays TIPS</u>	<u>L B Gov/ Credit</u>
High:										
1973	10.27	58.67	157.55	7.27	43.96	55.92	-23.39	-23.13	3.61	-7.24
1974	14.14	22.23	-3.29	27.44	5.82	51.31	-31.15	-34.70	4.67	-12.24
1975	9.06	-24.10	-8.31	3.15	-7.11	-33.13	9.38	21.77	-1.47	2.97
1976	8.03	-18.47	15.29	38.85	7.40	-11.46	36.58	4.97	2.48	6.99
1977	7.44	2.73	-0.56	27.55	38.18	14.17	13.96	-6.29	1.74	-4.14
1978	7.64	22.27	-7.10	20.52	20.27	27.36	2.51	8.25	3.49	-6.00
1979	11.97	19.50	95.45	21.87	16.91	107.70	21.33	-0.91	3.66	-8.64
1980	11.68	-0.54	4.69	18.93	-5.61	0.25	11.35	12.53	0.57	-7.72
1981	9.57	-29.74	-15.94	13.29	-6.35	-38.07	-3.24	-13.11	2.66	-2.12
AACR (%)	9.96	2.59	17.24	19.43	11.25	11.29	2.08	-4.99	2.36	-4.40
Correlation		0.10	0.23	0.10	---	0.30	-0.20	-0.25	0.27	-0.16
Low:										
1982	5.34	5.90	-13.21	14.27	-6.77	6.32	15.44	4.15	9.19	24.45
1983	4.61	11.13	-11.43	-4.04	-3.85	-18.49	24.89	16.56	-1.88	3.24
1984	4.11	-2.94	-14.48	-5.42	-0.88	-22.30	16.15	0.58	3.35	10.48
1985	3.81	5.98	-4.03	-14.54	-6.13	2.02	14.71	35.41	6.71	16.85
1986	1.36	0.68	-32.66	-36.27	1.92	17.88	17.57	39.99	6.54	14.07
1987	3.49	19.60	-10.10	12.85	18.32	20.23	-6.90	12.25	2.71	-1.15
1988	3.76	23.30	-0.45	14.27	31.47	-18.73	9.36	18.82	4.17	3.69
1989	4.49	32.34	20.94	-5.27	31.27	-6.46	4.16	11.59	6.81	9.32
1990	5.50	22.35	23.66	-0.37	5.00	-7.46	-19.75	-21.34	4.78	2.64
1991	3.51	-9.31	-35.12	-13.71	13.76	-12.82	31.09	14.27	3.22	12.19
1992	2.74	1.64	0.19	12.68	28.10	-8.24	11.53	-7.75	6.17	4.72
1993	2.56	-14.51	-29.62	-4.78	17.66	14.40	16.69	19.45	5.90	8.26
1994	2.28	2.94	20.23	-19.62	13.08	-4.24	0.87	2.73	-2.96	-5.66
1995	2.23	17.70	9.75	57.31	10.82	-1.09	12.75	18.08	10.88	16.64
1996	2.38	30.80	29.35	43.84	8.46	-6.72	32.11	10.84	2.56	0.51
1997	1.84	-15.63	-32.67	-45.09	16.43	-23.19	18.11	13.67	4.92	7.77
1998	1.33	-36.59	-33.12	-15.69	6.34	-1.79	-18.60	22.70	2.66	8.03
1999	1.79	38.45	108.72	17.03	10.49	-0.64	-6.29	22.74	0.44	-3.86
2000	2.49	46.10	2.14	340.85	2.67	-8.48	23.29	-15.29	10.44	9.13
2001	1.17	-32.72	-26.83	-74.19	-7.12	0.24	12.61	-17.79	6.73	7.25
2002	1.96	29.53	54.24	65.33	-0.91	21.62	1.82	-21.43	14.73	8.90
2003	1.57	18.75	2.53	28.19	6.64	19.35	34.91	30.93	6.42	2.96
AACR (%)	2.92	6.59	-3.16	1.90	8.36	-2.66	10.20	8.17	5.13	7.07
Correlation		0.27	0.21	-0.21	---	-0.04	-0.03	-0.21	0.06	0.02
Entire Period:	4.92	5.41	2.37	6.70	9.19	1.20	7.77	4.17	4.32	3.61
		0.15	0.24	-0.03	---	0.29	-0.07	-0.20	0.26	-0.16

Sources: Barclays Capital, Hancock Timber Resources Group, National Council of Real Estate Investment Fiduciaries, Thomson Datastream, *The Wall Street Journal*, Bridgewater Associates, and Morgan Stanley Capital International. MSCI data provided "as is" without any express or implied warranties.

Notes: All real annual returns are in U.S. dollars. All correlations are calculated using nominal quarterly data in U.S. dollars. Timberland Index represents John Hancock Timberland Index 1970-86 (Southeast, Northwest), 1970-93 (Northeast); NCREIF Timberland (South, West) 1987-present, (Northeast) 1994-present. Market portfolio is 50% of value in the South, 40% in the Pacific Northwest, and 10% in the Northeast. The Barclays TIPS Index is simulated from 1973-96 using returns calculated by Bridgewater Associates that assume a constant ten-year duration. The series uses live data beginning in 1997.

Exhibit 3

**CORRELATION MATRIX:
SELECTED INDICES AND CPI-G7 INFLATION**

January 1, 1973 - December 31, 1981

	<u>G7 CPI</u>	<u>MSCI World</u>	<u>GSCI</u>	<u>Gold</u>	<u>Natural Gas</u>	<u>Crude Oil</u>	<u>Barclays TIPS</u>	<u>Lehman Bros Gov/Credit</u>
G7 CPI	1.00							
MSCI World	-0.25	1.00						
GSCI	0.10	-0.39	1.00					
Gold	0.30	0.09	0.22	1.00				
Natural Gas	0.10	-0.03	-0.32	0.09	1.00			
Crude Oil	0.23	-0.29	0.11	0.11	-0.05	1.00		
Barclays TIPS	0.27	0.19	0.19	0.31	-0.06	0.21	1.00	
Lehman Bros Gov/Credit	-0.16	0.53	-0.07	0.07	-0.04	-0.07	0.77	1.00

January 1, 1982 - December 31, 2003

	<u>G7 CPI</u>	<u>MSCI World</u>	<u>GSCI</u>	<u>Gold</u>	<u>Natural Gas</u>	<u>Crude Oil</u>	<u>Barclays TIPS</u>	<u>Lehman Bros Gov/Credit</u>
G7 CPI	1.00							
MSCI World	-0.21	1.00						
GSCI	0.27	-0.19	1.00					
Gold	-0.04	0.09	0.24	1.00				
Natural Gas	-0.21	0.05	0.23	0.04	1.00			
Crude Oil	0.21	-0.28	0.83	0.29	0.05	1.00		
Barclays TIPS	0.06	-0.10	-0.05	0.12	0.18	-0.09	1.00	
Lehman Bros Gov/Credit	0.02	0.08	-0.19	0.08	0.17	-0.23	0.80	1.00

January 1, 1973 - December 31, 2003

	<u>G7 CPI</u>	<u>MSCI World</u>	<u>GSCI</u>	<u>Gold</u>	<u>Natural Gas</u>	<u>Crude Oil</u>	<u>Barclays TIPS</u>	<u>Lehman Bros Gov/Credit</u>
G7 CPI	1.00							
MSCI World	-0.20	1.00						
GSCI	0.15	-0.26	1.00					
Gold	0.29	0.06	0.22	1.00				
Natural Gas	-0.03	0.03	0.13	0.05	1.00			
Crude Oil	0.24	-0.29	0.57	0.20	0.04	1.00		
Barclays TIPS	0.26	-0.02	0.05	0.25	0.14	0.05	1.00	
Lehman Bros Gov/Credit	-0.16	0.26	-0.15	0.03	0.10	-0.18	0.72	1.00

Sources: Barclays Capital, Thomson Datastream, *The Wall Street Journal*, Bridgewater Associates, and Morgan Stanley Capital International. MSCI data provided "as is" without any express or implied warranties.

Note: All correlations are calculated using nominal quarterly return data in U.S. dollars.