

Have hedge funds eroded market opportunities?

- **Hedge funds, with almost \$1 trillion under management before leverage, have become a dominant force in market trading.**
- As they grow larger, **they will eventually erode the same market opportunities** and mispricings they have relied on to create their superior returns.
- **Opportunities are disappearing fastest where hedge funds are very active**, where there are deep derivative markets, and where the same trading rules have been used for some time.
- **Opportunities remain ample where there are fewer hedge funds**, where derivative markets are not deep yet, and where funds use new trading rules, proprietary information, or advanced analytics.
- In **interest-rate markets**, a lot of basic relative value opportunities have been eroded. Funds have moved to newer products, and to the interaction between volatility and rates to reach the next level in relative value.
- In **credit**, the basic mispricings in short-maturity, BB-rated credits and momentum trading remain largely in place. But a deepening of the CDS market and the growth of credit funds will eventually erode many of these opportunities.
- In **equities**, well-published anomalies and relative value have been eroded significantly, although this is partly owing to low volatility.
- **Currencies** continue to offer good opportunities for active investing. Hedge funds are very active here, but their impact is offset by the size and diversity of other players in the FX market. As a result, the age-old opportunities—the carry trade and momentum—are alive and well. Standard models are suffering, although novel trading rules are still offering high returns to risk.
- **This year has been a difficult one for all active investors. Both structural and cyclical factors are at play.** In some markets, structural trends have reduced opportunities. On the cyclical side, this is largely because of the lack of momentum in views on the global business cycle. We believe this will prove temporary, with new active trading opportunities emerging later this year or next.

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The spectacular growth of the hedge fund industry in recent years raises the question whether they have become so large that they have eliminated the opportunities they are seeking to exploit.

Hedge funds are private investment firms that seek to gain high absolute returns by taking active positions in markets. Over the past decade, they have produced a higher return-to-risk than most other asset classes. As a result, they have attracted a steady inflow of capital to the point that they now manage close to \$1 trillion, before leverage, double that of five years ago. The high returns that hedge funds have produced are the result of their more effective organization, which makes them more efficient at exploiting active investment opportunities. We should expect, though, that the ever increasing deployment of capital by hedge funds will *eventually* lead to the erosion of these high-return opportunities and should then bring the return to hedge funds much closer to that of passively held assets.

The big question is, at what point are hedge funds so big that they arbitrage away the excess return opportunities they seek to exploit? We will address this issue by looking directly at a number of typical high-return opportunities, or market *inefficiencies*, that hedge funds have tried to exploit. We look at some standard opportunities in fixed income, credit, equities, and foreign exchange markets.

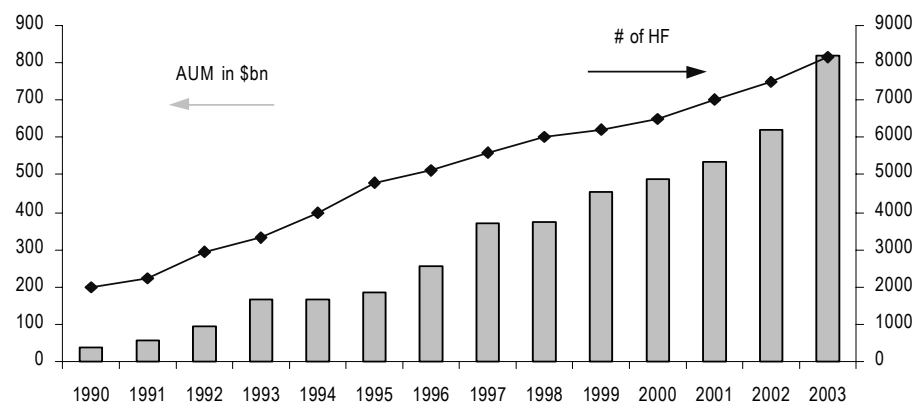
This issue is relevant not only for hedge funds and their investors, but also for other investment managers, such as banks and long-only ("real") asset managers, who try to emulate the techniques that hedge funds have used so successfully.

Sizing up the hedge fund industry

Hedge funds are private investment pools that offer shares in private placements. They have fewer than 100 high-net worth investors, which allows them to gain exemptions of regulations that typically apply to public investment vehicles. This relative lack of regulation gives hedge funds greater leeway to use derivatives and leverage to seek out high-return opportunities across markets.¹

Chart 1: Number of hedge funds and assets under management (AUM)

\$bn, number



Source: HFR, Van Hedge Advisors.

1. For a description of the US regulations that hedge funds are subject to, see *Implications of the Growth of Hedge Funds*, SEC, Sep 2003.

More than \$800bn under management

Hedge funds have been around for over 50 years, but they have grown most dramatically over the past decade. The number of hedge funds increased fourfold from 1990 to 2003 (from 2,000 to over 8,000; Chart 1). Their assets under management (AUM) grew 20 times over this period, from \$38 billion to \$817 billion. Van Hedge Fund Advisors forecast that by 2008 there will be 11,700 hedge funds with \$1.7 trillion AUM (an additional growth of 16% per year).

Hedge funds hold less than 1% of world assets

This is a huge sum, but its impact needs to be put in context of the overall size of the asset market. Hedge funds are an alternative way for savers to invest money; their size should thus be compared with the bulk of financial assets that savers hold in banks, pension funds, mutual funds, and insurance companies. Total savings can be most easily approximated by the total capitalization of world bond and equity markets plus the total assets of the world banking system (although there is some double counting, as banks hold bonds and equities). At the end of 2003, world equity and bond capitalization amounted to \$74 trillion, while total assets of the world's largest 1,000 banks amounted to \$52 trillion. On this basis, hedge funds' \$817 billion in assets under management amounted to only two thirds of 1% of total financial assets in the world (Chart 2 and Table 1).

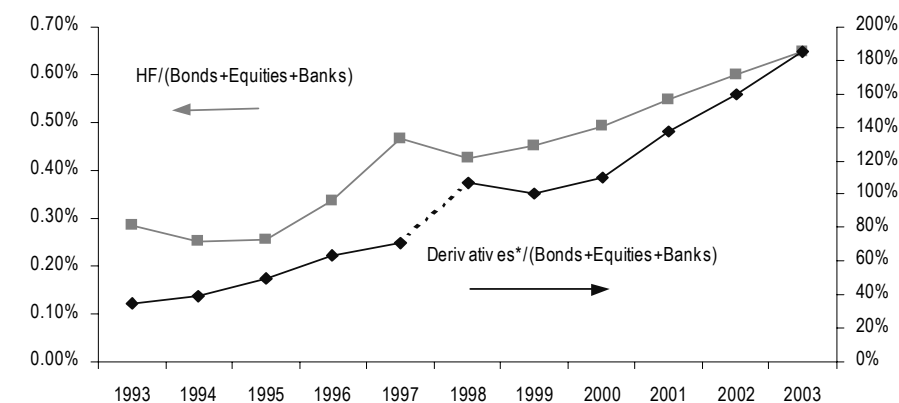
With leverage, they control at best 3% of world assets . . .

Given that hedge funds can leverage, they control more assets than the capital they receive. A 2002 survey by Van Hedge Advisors found that 27% of funds do not use leverage, 45% leverage less than 1-for-2, while 28% use more than 1-for-2 leverage. This would indicate an average leverage of 1-for-2. However, funds that use leverage are generally more involved in macro and fixed-income strategies than equities, and are typically bigger. Taking this into account suggests an average leverage weighted-by-assets of maybe 5. In any case, on either basis, hedge funds would still control a maximum of about 3% of world assets. Hedge funds, however, make up a much bigger part of volumes of trading on financial assets, given the typically fairly high turnover of their funds relative to the traditional real money investors. Hedge funds could account for a third of trading volumes on some financial assets (indeed, anecdotal evidence suggests they can at times dominate trading in certain assets).

. . . but make up a much higher share of trading volumes

Chart 2: Hedge fund AUM and derivatives outstandings relative to total market

Percent, total market is sum of world equity and bond markets outstandings and total assets held by banks



Source: IFSL, BIS, JPMorgan.

There is a large variety among the investment strategies pursued by hedge funds (Chart 3; about 50% of AUM seem to relate exclusively to equities and related markets). On one extreme, macro funds are most directional, employing top-down macro views to take advantage of expected movements in various asset classes. On the other extreme are market-neutral relative value arbitrage firms that seek to exploit temporary price anomalies between related assets, in equities or fixed income, while staying overall neutral to market levels. Between are funds who seek undervalued assets in equity or debt markets without necessarily being market neutral.

Hedge funds have produced relatively attractive returns over the past decade. Chart 4 shows the returns on the CSFB/Tremont hedge funds index over the past 10 years.² The average return on this index across the various types of funds over this period was 10.7%. Dividing the excess return over cash by the realized return volatility, hedge funds achieved a Sharpe ratio of 0.82, quite high compared with the 0.22 achieved by equities, and 0.51 achieved by US bonds since 1994.

Hedge funds as more efficient “arbitrageurs”

Hedge funds can be best analyzed as a structural innovation in the exploitation of return/risk differentials across markets and across time. Hedge funds are more effective tactical risk takers than most other asset managers because they are much more specialized; they are subject to fewer restrictions and constraints; and they have been able to ride the wave of product innovation in the financial industry. As such, the emergence of hedge funds and their impact cannot be separated from these three forces.

- Hedge funds are another step in the growing **specialization** in financial intermediation. They constitute a specialized form of tactical and strategic risk taking—a service that before was offered jointly with other intermediation services, by other asset managers. The organizational setup of hedge funds—such as their small size, management co-ownership, performance-based fees, and the limited ability of investors to withdraw funds at will—all allow hedge funds to be more effective risk takers.

Table 1: Global market outstandings (\$ tn)

	Hedge Funds AUM	Global Bonds	Global Equities	Assets of 1000 largest banks	Bonds + Equities+Banks	OTC +ET Derivatives*
1993	0.17	18.6	13.7	26.9	59.2	16.25
1994	0.17	21.2	14.5	30.3	66.0	20.20
1995	0.19	23.2	17.1	32.0	72.3	26.99
1996	0.26	24.1	19.5	32.7	76.3	35.47
1997	0.37	24.2	21.7	33.2	79.1	41.44
1998	0.38	27.4	25.4	35.5	88.3	94.24
1999	0.46	29.4	35.0	36.7	101.1	101.79
2000	0.49	30.2	31.1	37.9	99.2	109.46
2001	0.54	31.8	26.6	39.6	98.0	134.94
2002	0.62	36.7	22.8	43.9	103.4	165.49
2003	0.82	42.4	31.3	52.4	126.1	233.91

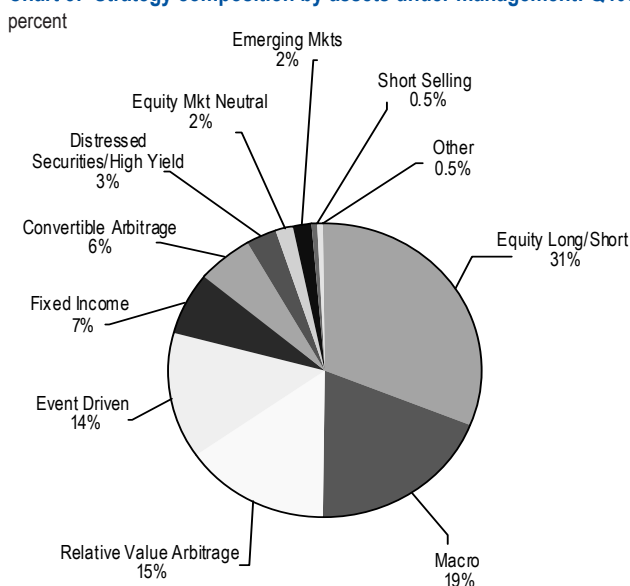
* Data break after 1997. Earlier data are from ISDA and include only swaps and all exchange-traded contracts. Later data are from BIS and include broader set of OTC derivatives, such as FX forwards, FRAs, commodities, and equity-linked. Source: BIS, HFR, IFSL, ISDA, Van Hedge Advisors International.

2. The data start in 1994 because before that date, data vendors did not collect data on defunct hedge funds and thus overestimated realized returns. We use this data base as it is one of only two that calculate asset-weighted returns (as opposed to equally weighted ones), and because it is based on the TASS reporting system, which is considered of relatively good quality.

Symbiotic relationship between growth of hedge funds and that of derivatives

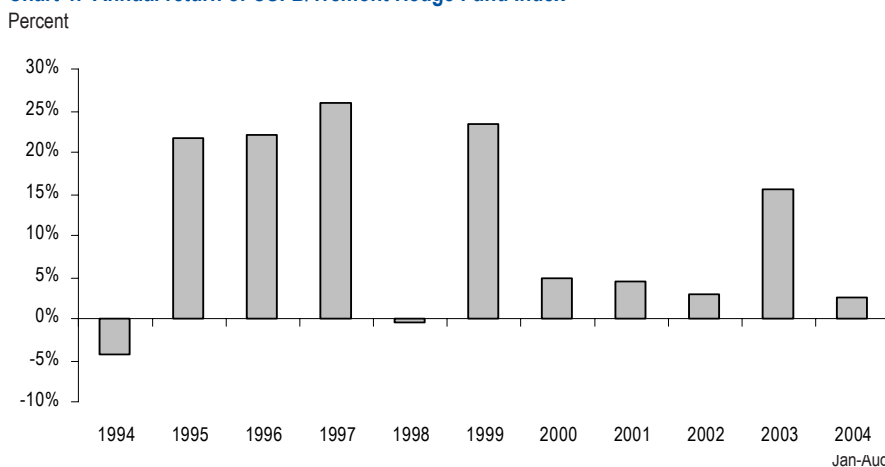
- Hedge funds are freer to exploit risk/return opportunities than traditional asset managers, as they are less subject to **benchmark tyranny** and to **public regulation**. Hedge funds have been able to convince the ultimate owners of the capital to write them an investment contract that gives them much greater freedom to use various instruments and assets to create high absolute returns, with little, if any, benchmark constraints. In addition, hedge funds are not directly subject to the world's regulatory authorities, although they are indirectly regulated, as hedge funds cannot operate without the help of banks who themselves are regulated in their activities. Banks impose considerable credit restrictions on hedge funds.
- The spectacular growth of hedge funds is closely linked to the **growth in financial derivatives**. Without financial derivatives, the great majority of hedge funds would not be able to operate as efficiently. And equally, the growth of hedge funds created the demand and liquidity that allowed the development of such derivatives.

Chart 3: Strategy composition by assets under management: Q403 global



Source: Hedge Fund Research, Inc.

Chart 4: Annual return of CSFB/Tremont Hedge Fund Index



Source: CSFB/Tremont.

In Chart 2, which shows the size of hedge funds relative to world financial market outstandings, we also show the face value of outstanding exchange-traded and OTC derivative contracts relative to the same world financial assets. It shows that derivative markets have had a similar growth pattern to hedge funds, although the aggregate amount of derivatives is much larger. Over the past ten years, the share of hedge funds in world financial assets has more than doubled (from 0.3% to 0.65%). Over this same time, the ratio of outstandings OTC and exchange traded derivatives to world assets grew from just over 40% to more than 180%. (Data on derivatives before 1999 are incomplete and probably underestimated by a third).

Where do hedge fund returns come from?

High returns ultimately derive from exploiting market inefficiencies

The high returns that hedge funds have produced over the years from active positioning in markets must ultimately derive from the exploitation of some form of market inefficiency. We use the term “inefficiency” in a broad sense as denoting any systematic excess return to risk across markets, exposures, or investment strategies.³ These usually result from market segmentation or behavioral patterns that induce deviations from pure market “rationality.”

Market segmentation prevents capital from effortlessly migrating from lower-return areas to higher-return ones. It typically results from institutional, contractual, or regulatory restrictions on asset managers or from differences across investors in investment objectives or ultimate liabilities. Segmentation brought on by **investment constraints** includes, for example, the reliance on external indices by asset managers and limitations on the use of derivatives or the share of foreign assets.⁴

Segmentation resulting from the existence of **different investment objectives and liabilities** reflects the fact that not everyone invests for the same purposes, or experiences returns and risks in the same way. The same asset may appear to offer a high or a low return to risk depending on the investor’s base currency, investment horizon, liabilities, or tax rate. US T-bills may be the risk-free asset to a US household, but are very risky for a UK pension fund with long-term liabilities.

Behavioral patterns that bring about return differentials include what economists call time-varying risk premia, or the rational tendency of risk premia to vary with economic conditions, widening during bad economic times, such as recessions when income is low, and tightening during good economic times. But these also include a series of cognitive biases, such as overconfidence, belief, perseverance, and conservatism, which make people reluctant to change beliefs efficiently and thus create perseverance and momentum in markets.⁵

To the extent that hedge funds are less subject to investment constraints or to behavioral biases—a big if—they can make excess profits by exploiting these return differentials. We can differentiate between two related approaches to earning high returns to risk: exploiting structurally high risk premia, and exploiting temporal market opportunities.

3. We use the term “inefficiency” to denote profit opportunities that provide returns greater than it is justified for their risk. However, risk is perceived differently among investors and therefore (e.g., a 30-yr bond is risky for a short investment horizon investor but relatively riskless for a pension fund with long term liabilities), what is inefficiency for one investor may not be for another investor.

4. These restrictions are not necessarily inefficient from an economic point of view. They exist usually to deal with so-called “agent” problems; i.e., the problem of making sure that the agents who manage your money acts in your interest, rather than theirs.

5. See Nicholas Barberis and Richard Thaler, *A survey of behavioral finance*, Handbook of the Economics of Finance, 2003.

Important nuance: In the following, we discuss the impact of the relentless search by market participants for high returns to risk on the remaining availability of these opportunities. Hedge funds are the most powerful manifestation and implementation of this search, but they are not the only participants seeking alpha. Bank proprietary desks and active real asset managers pursue the same goals. More properly, we are investigating the impact on market pricing of the global search for alpha which hedge funds have brought to a much higher level and are starting to own.

Exploiting structurally high risk premia

Seeking out excessive risk premia

A first strategy involves exploiting risk premia that are high for structural reasons. Financial assets have internal rates of return (IRRs) that can be broken down into the basic IRRs that drive actual returns on assets. For example, the IRR (yield) on a corporate bond consists of a short real yield dependent upon the official rate set by the central bank, expected future short rates, term premia, swap spreads, and the corporate asset swap spread.

An asset that seems properly priced may still have component IRRs with different returns to risk. One structural strategy of hedge funds is to invest in the component IRRs that are high relative to risk, by buying the asset and hedging out the other component IRRs that are not attractive. For example, if the credit spread to swaps is high relative to the credit risks taken, but other component IRRs are not, then one could buy the corporates, and hedge out other risks by doing the asset swap.

Traditional long-only investors typically have to take a view on a bundle of IRRs, as they cannot break the assets into separate IRRs. In contrast, hedge funds have the flexibility to receive just the IRRs they find attractive, and to hedge out the other ones (hence, the name, “hedge” fund).

This unbundling strategy is akin to the one that LTCM applied on an industrial basis during the 1990s. The idea underlying LTCM’s strategy was not unsound, but ultimately failed as it combined excessive leverage with concentrated positions in trades that lost their liquidity and saw increased return correlation during a crisis. Since then, both hedge funds and their creditors (the banks)—having learned a valid lesson—are applying much less leverage, but are still pursuing the same strategy of seeking out undervalued, overcompensated, risk exposures.

In the section below, we investigate to what extent the relentless search by hedge funds for high returns to risks has reduced structurally high risk premia across rates, credit, equities, and currencies. The results are summarized on page 32. We identify an “overcompensated” risk premium, and then assess whether this risk premium has been coming down in recent years. We use the period since 1998 as the “hedge fund period” as hedge funds were a much larger part of the financial landscape during these years than they were during previous ones.

1. Term premia at the short end of the curve

The short end of the curve has offered high return to risk in the past

The opportunity. On average, longer-maturity bonds offer higher returns than shorter-term ones (i.e., yield curves are typically upward sloping), as the volatility of returns faced by investors is higher at the longer end of the curve. We call this excess yield a term premium. It consists of the difference between forward rates and expected future short rates.⁶

6. See also *Term premia: What's priced in?* Matt King, Sep 1999, and Guy Coughlan and Nikolaos Panigirtzoglou, *Interest rate term premia and the shape of the yield curve in the long run*, Sep. 2004.

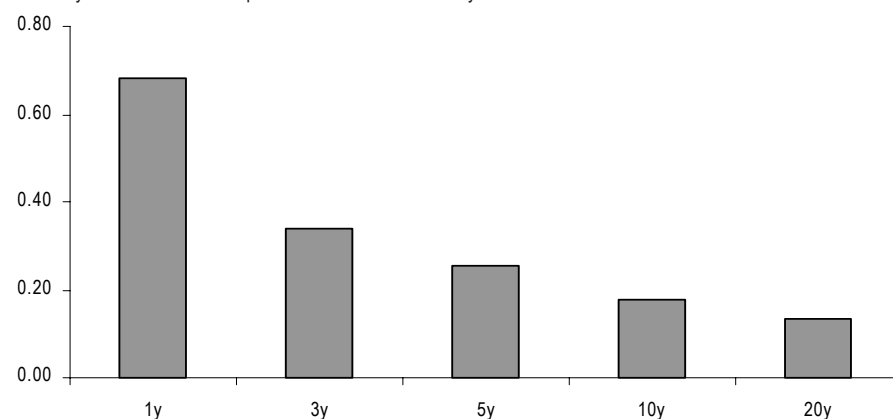
We have found that the risk-return relationship along the curve is not a linear function of maturity, nor of duration, nor of return volatility. Instead, we find that the return-to-risk ratio is uneven and highest at the shorter end of the yield curve. Chart 5 shows the ratio of the average carry and slide on 1-, 2-, 3-, 5-, and 10-year US Treasury yields over the annualized return volatility of these bonds since 1953. The highest return to risk comes at the 1-year point of the curve. Chart 6 looks more in detail at the money market curve since 1998, splitting up the first two years into eight 3-month forward rate segments. This shows the highest return to risk at the 3-month in 12-month part of the money market. The pattern for the euro curve is very similar.

1-year maturity falls in between bond funds and money market funds

Segmentation. Although it is not possible to prove what exactly causes this differential risk pricing along the curve, it is at least consistent with one form of segmentation in the fixed-income markets.⁷ Indeed, the 1-year maturities fall between cash-

Chart 5: Carry and slide to risk ratios on US Treasuries: 1953-2004

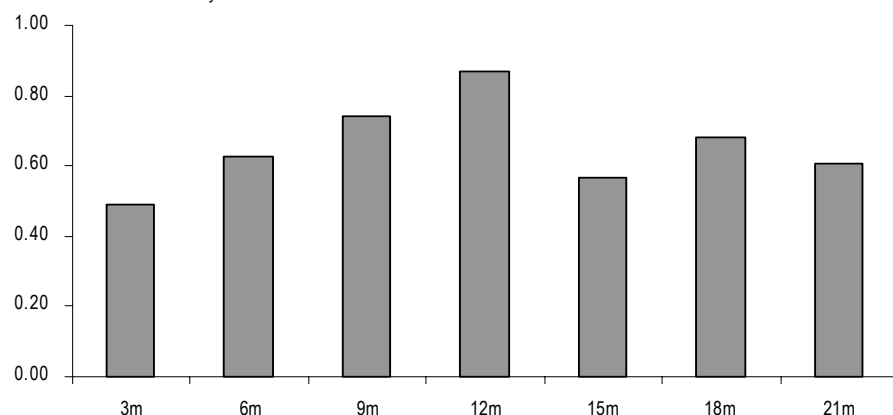
Ratio of yield minus T-Bill rate plus slide over return volatility



Source: JPMorgan

Chart 6: Carry to risk ratios on 3-months forwards: 1998-2004

Ratio of slide over volatility



Source: JPMorgan.

7. A second segmentation could come from the gap in investment horizons between the two main reasons to invest in fixed income — the precautionary and transaction demand for money on one side and saving for old age on the other side. The former has a clear preference for cash, while the latter has a long-term investment horizon and thus prefers long-dated debt. This leaves the belly of the curve without a clear “preferred habitat” and thus requires it to offer a higher return to risk than the wings of the curve.

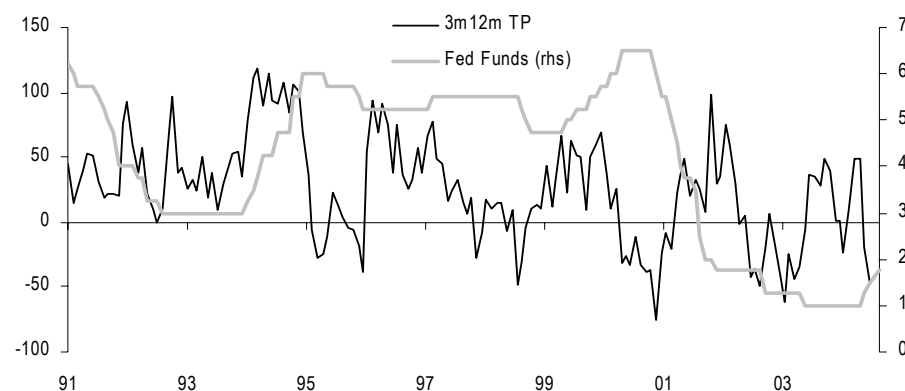
oriented investors such as money market funds, who invest in short paper below half a year,⁸ and bond funds, who follow indices that start at 1-year maturity. All major bond indices in the world, including the JPMorgan family of bond indices, drop bond issues that are within 13 months of redemption. Some managers will sell bonds at this point as holding on to them creates duration and/or curve risk against their benchmark. With no natural buyers below this maturity point, bonds cheapen up as they approach the 1-year maturity spot, and then richen again as they come within sight of the money market industry.

It is our perception that hedge funds have been exploiting this relatively higher return-to-risk at the short end by putting on curve steepeners and structural receivers at the short end. Obviously, they frequently trade around this position, but on average, they tend to be long the short end of the curve. Traditional bond managers, in contrast, cannot focus on this point of the curve as it makes them dangerously short duration against their benchmark. Clearly, the more capital that hedge funds direct to this trade, the more this excess term premium should disappear.

Testing. Chart 7 show our measure of the term premium on 3-month, 1-year out forwards for dollars that we have published over the past 5 years.⁹ Specifically, it consists of the difference between the 3-month, 1-year out rate Libor forward minus the market's consensus forecasts of that rate 1-year out. This is the purest measure of the excess return that the money market offers for taking out duration risk at that point of the curve.

Chart 7: Estimated term premium and official rates in the US

% lhs, bp rhs



Source: JPMorgan

Table 2: Average term premia and implied volatilities 1-year out

basis point premia and basis point/day volatilities

	US		Germany/Euro area		UK	
	term premium	impl. vol	term premium	impl. vol	term premium	impl. vol
91-97	49	7.8	33	5.8	35	8.4
98-04	11	6.5	12	4.6	13	6.0

Source: JPMorgan.

8. In the US, 2a-7 money market funds are permitted to buy paper up to 13 months in maturity, but most choose to stay below 3-month average maturity, as their clients use these accounts as checking accounts, and thus do not like principal risks created by yield changes. During the second quarter of this year, for example, the average maturity of US money market funds, which manage \$1.9 trillion in assets, fluctuated between 46 and 57 days.

9. See *Short-end term premia report*, Gianluca Salford, Sep 2004. This report also analyses term premia in euros and sterling.

Excess term premium at 1-year maturity has disappeared

We have found, not surprisingly, that this risk premium along the term structure has fluctuated with the perception of uncertainty about what rate the central bank will set in 1 year's time, as measured by implied volatility on option contracts on Libor forwards in 1 year. However, even when taking into account a modest decline in this implied option volatility, we find that term premia in the US, UK, and the Euro area have fallen dramatically in recent years. Table 2 shows how the average term premium fell from a range of 33-50bp during 1991-97 to only 11-13bp during the period since 1998. The implied option volatility fell much less.¹⁰

In short: It is impossible to prove this decline in term premia is due to hedge fund "arbitraging" this initial mispricing. But it is at least consistent with it, and with the types of trades hedge funds have been doing.

2. Credit spreads at the short end of the curve

Excess returns to credit risk at the short end of the curve

The opportunity. The previous section discussed term risk premia along the interest rate curve, arguing that these risk premia have been excessive at the short end. The same phenomenon exists along the credit spread curve. We find that credit spreads do widen significantly as credit ratings worsen: Table 3 shows how the aver-

Table 3: Euro Industrial yield spreads to government curve

Basis points average 1997-2004

	1 to 3	3 to 5	5 to 7	7 to 10
AAA	11.6	13.4	17.2	22.4
AA	21.8	27.6	33.1	39.7
A	45.7	59.5	65.9	72.9
BBB	107.4	120.0	113.9	120.6

Source: JPMorgan.

Table 4: Expected losses due to net downgrades

Basis points, based on long-term Moody's transition matrices and 36% recovery rate

	1 to 3	3 to 5	5 to 7	7 to 10
AAA	3	5	10	13
AA	2	3	6	8
A	18	22	26	27
BBB	78	77	74	72

Source: JPMorgan, Moody's.

Table 5: Euro Credit Sharpe ratios: (Spread - expected losses) over (spread volatility × duration) ratio, 1997-2004

	1 to 3	3 to 5	5 to 7	7 to 10
AAA	0.40	0.22	0.16	0.13
AA	1.02	0.65	0.45	0.36
A	0.49	0.40	0.34	0.29
BBB	0.24	0.22	0.18	0.14

Source: JPMorgan

10. One explanation of the low term premia observed in recent years is that we are mismeasuring market expectations of future short rates. We estimate term premia by deducting from forward rates the median forecast for future short rates obtained by *Consensus Economics*, a company that collects forecasts by professional forecast units, largely banks. These forecasts are modal, best-guess forecasts, and will deviate from the *mean* forecast of the market when investors see a risk bias around this modal forecast. This was probably frequently the case during the most recent recession, when markets saw a downward risk bias, leading our estimate to reveal negative term premia, something that should not occur within our volatility driven framework. Hence, we likely underestimated actual term premia in markets in recent years. In the UK and EU, we were able to adjust for this skew in expectations but even here we found that the price of volatility has fallen in recent years.

age spread to government debt on our JPMorgan Credit Index since 1997 widens significantly as ratings move from AAA to BBB. But the same is much less the case as we move along the maturity curve. Focusing on BBB-rated bonds, for example, the average spread on 1-3 year paper has been 107bp since 1997, very similar to that on 5-10 year paper.

Testing. The maturity curve for spreads is thus relatively flat. To assess whether it is too flat, we need to relate credit spreads to risk. To assess expected credit returns, we take the average spread since 1997 and deduct a measure of the average loss due to defaults and net downgradings obtained from Moody's long-term transition matrices.¹¹ These expected losses are shown in Table 4.

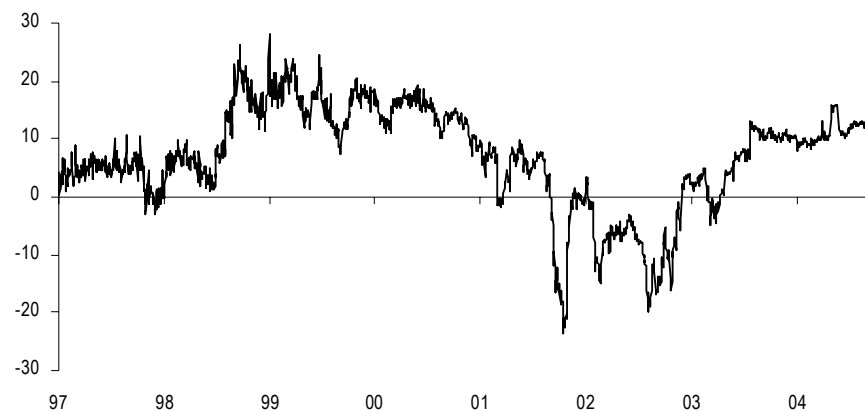
Table 5 shows the ratio of the spreads minus downgrading losses over risk, measured by the volatility of these spreads times duration.¹² It shows that indeed the return to credit risk is significantly higher in 1-3 year paper than at the longer end of the credit spread curve. Admittedly, this excess return at the short end includes a premium for the lower liquidity and may thus be the result of our mismeasuring the true risk of holding less liquid paper at the short end. Nevertheless, the size of the excess return at the short end seems large compared with reasonable estimates of an illiquidity premium.¹³

**No steepening of credit curve yet;
opportunity remains alive**

The excess return at the short end of the credit spread curve is not a secret and credit funds have systematically tried to exploit it. Their activities have so far not yet led to a steepening of the credit maturity curve. Chart 8 shows, for example, the gap between 7-10 year and 3-5 year swap spread for A-rated paper in euros since 1997 and indicates no tendency to steepening. The spread started at less than 10bp in 1997 and remains at this level, after widening during the recession. Other parts of the credit curve have similarly shown no tendency to steepen.

Chart 8: Yield spread between 7-10 year and 3-5 year sectors in A-rated Industrials in Euros

Basis points



Source: JPMorgan.

11. We do not use realized returns on credit indices as we needed to capture an ex ante risk premium.

12. We use a mark-to-market concept of credit risk as it is most relevant to hedge funds. An alternative concept of credit risk can be calculated for buy-and-hold investors. This is the basis of our Rock-Bottom Spread methodology: See Peter Rappoport, Rock Bottom Spreads, Oct 2001. Earlier this year, Lee McGinty (et al.) used this methodology to derive what the 5-to-10-year credit curve should look like. They concluded that the curve depends on the overall level of credit spreads. This implies that 5s-10s in credit spreads should be upward sloping for higher-grade credit and during good economic times (low default risk) but should be downward sloping for lower-grade credit and during bad economic times. See *The Curve of DJ TRAC-X Europe*, Jacob Due, Lee McGinty and Rishad Ahluwalia, Jan 2004.

13. Ideally, the Credit Sharpe ratios should be calculated on a same-sector basis. Some of the differences across ratings and maturities could be due to other risk factors, such as sector composition. Using only single-sector data, however, creates sampling problems. The fact that the 1- to 3-year sector has the highest Sharpe ratio for each ratings category suggests that this pricing is not merely due to sectoral composition.

In short. Managers have had limited impact on the curve here, as a spread-duration neutral curve steepener, which is what would be needed, requires leveraging the short end, which cannot really be done in cash products, except in limited fashion through under- and overweighting these sectors in long-only portfolios. CDOs exist largely in 5-year maturities and CDSs exist mostly in 5- and 10-year maturities. The 5- to 10-year curve spread in Euro TRAC-X is 22bp at the moment, a bit wider than in cash, but not much so. Recently, we have seen growing liquidity in shorter-term CDS (1-, 2-, and 3-year) in the mostly widely traded names. In these single name CDSs, we have seen a steady steepening of the CDS curve. Hence, we need to await the broadening of liquidity at the short end of the credit derivative markets before we see more credit curve steepening.

3. The mispricing of BB's

The BB sector has offered higher returns to risk than other sectors

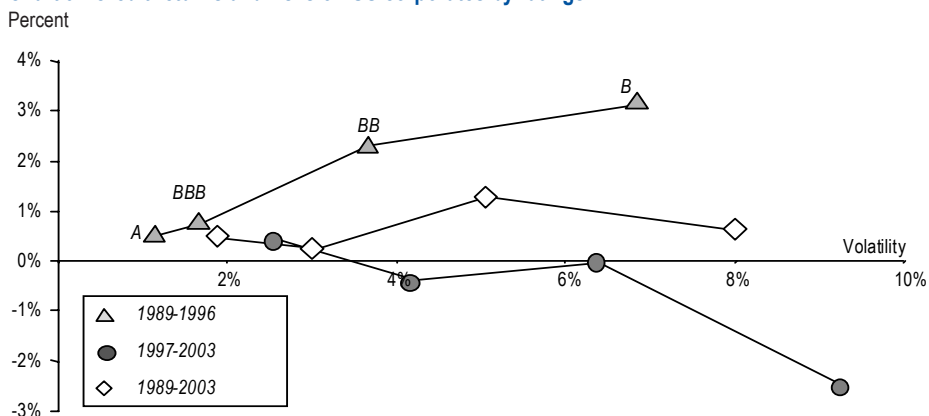
The opportunity. A second “mispricing” in credit relates to BB-rated paper. We have found in the past that BBs have tended to offer a much higher IRR relative to their credit risk than any other corporate rating. Chart 9 shows the excess returns and return volatilities on US credits over US Treasuries over 3 periods in the past 15 years in four rating categories: A, BBB, BB, and B. It shows that BB rated bonds have been “sticking out” relative to BBB and B rated bonds, delivering an excess return to risk compared with its two neighboring ratings sectors.

Market segmentation between IG and HY indices and the yield preference of HY investors have made BB cheap

Segmentation. Two forms of market segmentation are probably the culprit for this excess return on BB rated credits. The first is that BB rated credit are the first rating below investment grade. When a corporate bond is downgraded from BBB—the lowest investment-grade rating—fund managers who are limited to buying investment-grade bonds have to sell this bond, depressing its price, and pushing up its yield. Insurance companies do not have this problem but instead have onerous capital requirements on lower-grade bonds, inducing them to sell if the spread is not high enough relative to the increased capital levy.

The second is the behavior of retail investors in high-yield bond funds. During the 1990s, these investors tended to focus myopically on the quoted yield of high-yield funds, forcing high-yield managers to overweight the lowest-quality (highest-yielding) paper in the high-yield index, despite their inferior historical return to risk. B, CCC, and lower-rated debt thus tended to be priced at yield spreads that barely compensate the holder for the high expected losses due to default. By now, high-yield

Chart 9: Credit returns and risks on US corporates by ratings



Source: Merrill Lynch, JPMorgan.

managers do not appear as yield-myopic as they were in the past, but there is no guarantee they will not be forced to return to their yield-hungry days.

The combination of these two forms of market segmentation has made BB rated debt produce a relatively high IRR compared with its credit and price risk. Hedge funds are not subject to these segmentation inefficiencies and should thus be able to exploit this mispricing. Similarly, the growth of hedge funds and more importantly of CDOs, as well as the growing popularity of “universal” benchmarks, should allow investors not tied to investment-grade indices to arbitrage away this segmentation-based inefficiency in credit spreads.

A credit risk neutral barbell of being long BBs against BBBs and Bs earns 100bp

Testing. Investors can exploit the cheapness of BBs by switching from a default risk-weighted portfolio of BBBs and Bs into BBs. The Moody's-based annual historical default losses on these ratings are 0.5% for BBB, 1.5% on BB, and 7.0% on B rated credits. A barbell of 85% in BBB and 15% in Bs provides the same expected losses as a portfolio of BBs.¹⁴ The return on this credit-risk neutral barbell (being long BBs) would have been 100bp over the past 15 years.

Chart 10 shows the return on this credit barbell over time, indicating there has been no tendency for it to come down.

The BB opportunity remains alive

In short. We do find that this excess spread on BBs is cyclical and tends to move with the overall level of yields. The current excess spread (Aug 2004) of 97bp is below the 10-year average, but is in line with the overall yield level (Chart 11). Overall, we thus find that the mispricing of BBs has been partly eroded as investors have noticed the relative attractiveness of BBs, but also by the overall low level of yields. This excess return should partly return as yield levels rise in the future. For the complete erosion of this opportunity, we likely need to await wider usage of CDSs and CDOs, further growth in credit hedge funds, and reduced transaction costs.

Chart 10: Excess yield on BB rated credits against risk-weighted barbell of BBBs and Bs

Percent, barbell is $BB - 0.85 \times BBB - 0.15 \times B$



Source: JPMorgan.

14. It also has the same sensitivity to overall changes in the probability of default as this would raise the default probability of each rating category by the same percentage point.

High-yield currencies outperform low-yield ones

FX is a huge market but one with a very diverse set of participants

4. Forward bias in FX

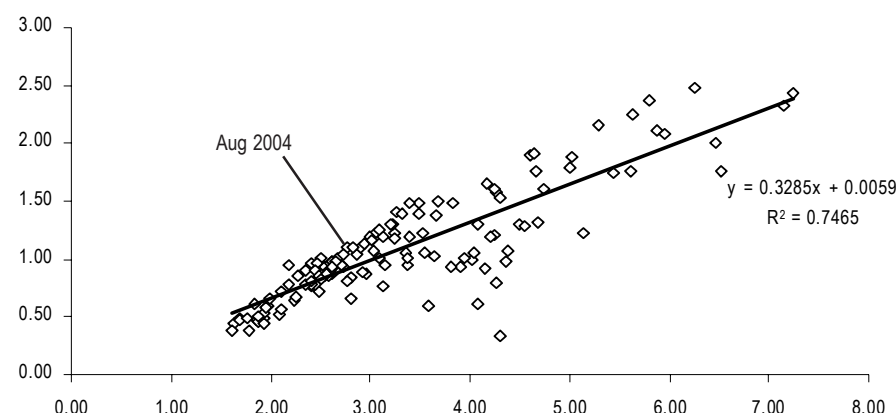
The opportunity. In currency markets, market efficiency is usually defined as uncovered interest parity (UIP), or FX forwards functioning as efficient predictors of future spot rates. FX forwards reflect interest rate differentials. Under UIP, high-yielding currencies will on average depreciate against lower-yielding currencies at a pace that equals their yield gap. A strategy to systematically invest in higher-yielding currencies, funded in lower-yielding currencies, should on average earn zero return under UIP. Hedge funds and FX overlay funds are aware that this efficiency condition has not held in recent years and have thus pursued high-yield currency strategies. This does not imply that they are always long high-yielding currencies, but it implies that they trade around an overweight position in high-yield currencies.

Segmentation. Although the largest and most liquid market in the world, with a daily volume of \$1.9 trillion a day by this year's BIS Survey, the FX market also exhibits strong forms of market segmentation. Most important is that a large number of participants have different currency bases, which implies that each interprets and experiences risk in a different manner. In addition, the major players—asset managers, hedge funds, pension funds, corporations, and governments—each have different objectives, which again prevents the emergence of a single standard of pricing of currencies and risk.

Testing. Chart 12 depicts the return to risk (information ratio) of a strategy that buys the three highest-yielding currencies in JPMorgan's Global Bond Index since 1985 and sells the three lowest-yielding currencies. It shows a full-period return-to-risk ratio of 0.67, and no trend. Chart 13 shows the return from being long carry in emerging markets from our Emerging Local Markets Index. The information ratio since 1996 has been 0.57.

Hedge funds do not blindly put on all positive carry trades in currencies, but go for the ones where they see the highest upside with the least downside risk. It is hard to measure expected capital appreciation, but it is easy to rank carry by currency risk. We have modelled this trading approach with our Carry-to-Risk indicator.¹⁵ It buys the G-10 currency pairs (vs USD or EUR) that have a Carry-to-FX volatility ratio in excess of 0.2. Chart 14 depicts the rolling return-to-risk ratio of this trading strategy and it shows that this ratio has fluctuated around 2.0, and has shown no trend, al-

Chart 11: Excess yield on risk-weighted barbell of BB against B and BBBs versus BB yield level
Percent, barbell is $BB - 0.84 \times BBB - 0.15 \times B$ (y-axis), BB-spread on x-axis



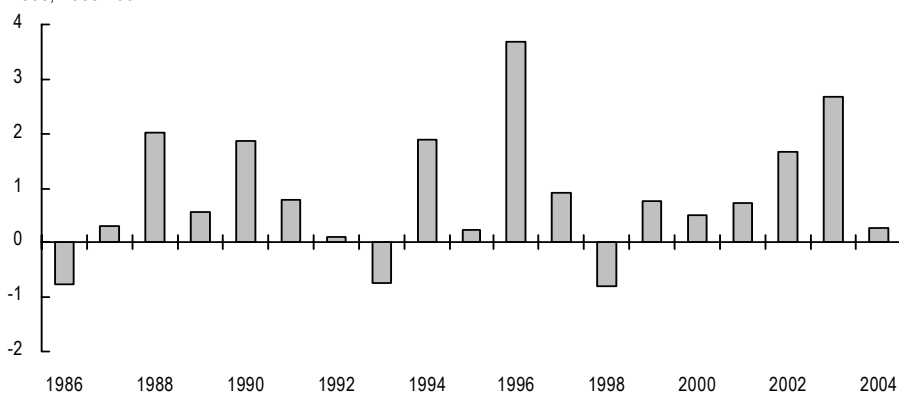
Source: JPMorgan.

15. See John Normand et al, *JPMorgan's FX and Commodity Barometer*, Sep. 22, 2004.

though it has produced no returns so far this year. In effect, UIP does not hold and investors should be able to systematically make money by going long higher-yielding currencies.

Chart 12: Return to risk on buying 3 highest- against 3 lowest-yielding currencies in GBI

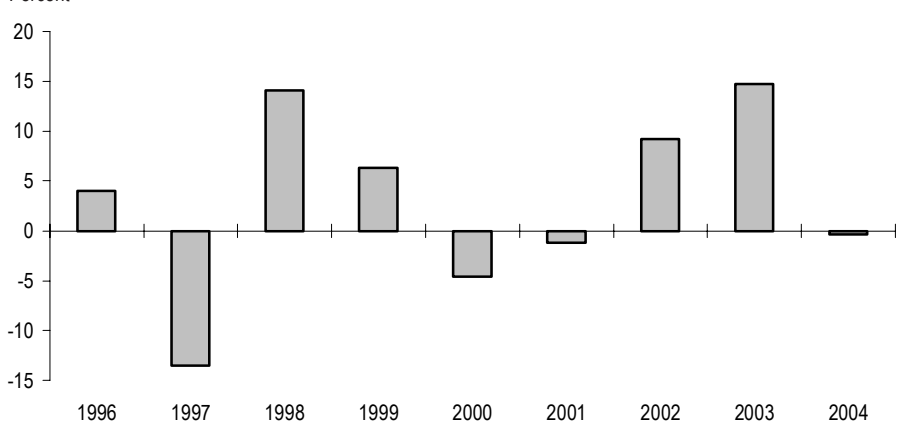
Ratio, 1985-2004



Source: JPMorgan.

Chart 13: Return on JPMorgan Emerging Local Markets Index

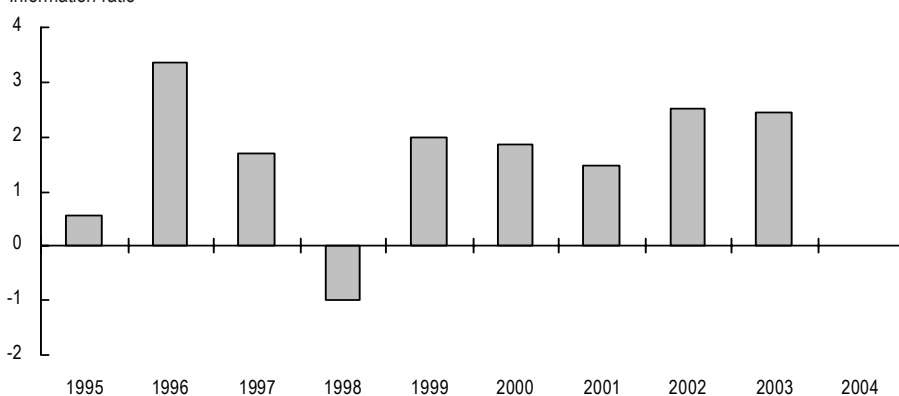
Percent



Source: JPMorgan.

Chart 14: FX carry-to-risk model

Information ratio



Source: JPMorgan.

The FX carry trade is alive and well

In short, we find that hedge funds and other FX overlay funds, which all use carry as a signal on what currencies to buy, have not yet exploited this basic inefficiency in currency markets to the point that they have been able to arbitrage it away. This is most likely because this inefficiency is based on high real policy rates reflecting strong economies and high return on capital, which in turn attract capital into such countries. These capital flows are likely so significant that even the large size of hedge funds and active FX overlay funds has not been able to arbitrage it away.

5. Equity anomalies

Equity market opportunities have led to the creation of a large number of hedge funds

There is a huge literature on systematic mispricings, or anomalies, in equity markets that began just after Eugene Fama published his seminal work on market efficiency.¹⁶ Most of these have been written up in the finance literature and frequently led the authors to set up hedge funds to exploit these anomalies. A review of these anomalies deserves a book-length treatise and is thus well beyond the scope of this study.

Hence, we only focus on two more recent examples: trading entry and exits from equity indices, and convertible arbitrage.

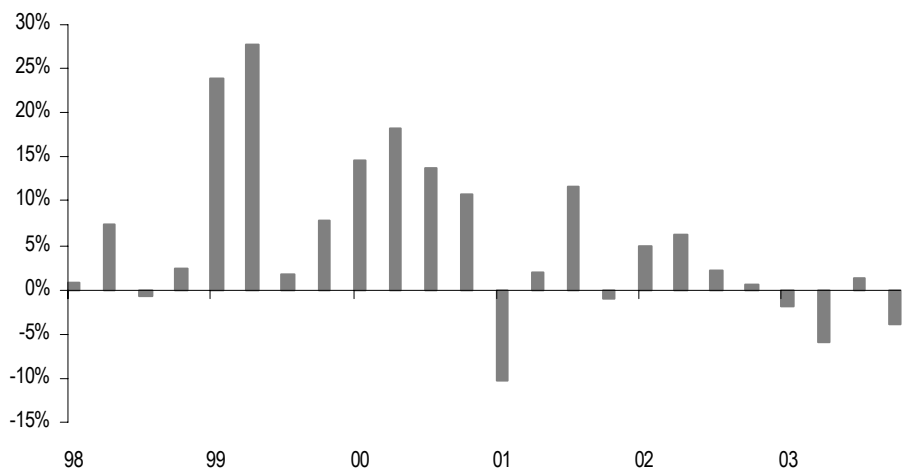
Opportunity 1: Entry/exit from equity indices. Hedge funds have been buying shares that are likely to enter equity indices and selling those that will be thrown out, as institutional investors will have to do the same later, once these changes take place.

Segmentation: Index change trades come about because passive index tracking funds need to follow index changes. When the composition of the index changes, they need to buy shares joining the index and sell shares leaving the index. To track the index faithfully they need to trade these shares on implementation date.

Index trades have been eroded

Testing 1. Chart 15 shows how a strategy of buying shares of companies likely to move into the FTSE 100 (the 5 largest cap stocks not yet in the index) and selling the shares of companies likely to move out (the 5 smallest cap stocks in the index) one month before index review has fared over time. This trade used to be quite profitable four to five years ago, but has been eroded as it has become increasingly arbitrated.

Chart 15: FTSE100 entry-exit return strategies



Source: JPMorgan.

16. See Eugene Fama, Efficient capital markets: A review of theory and empirical work, *Journal of Finance*, 1970, 383-417, and *Foundations of Finance*, 1975.

Convertible arbitrages have been profitable...

Opportunity 2: Convertibles. The standard trade of convertible arbitrage hedge funds, which represent some 10% of total hedge fund AUM, is to try and capture the difference between volatilities imbedded in convertible bonds and those on stock options.

Segmentation: In the past, companies were forced to issue convertible bonds expensively; i.e., the implied volatility on the conversion option was typically lower than what the implied volatility for the company stock was in the equity market. The buyers of convertibles did not have the ability to sell the cheap option, or hedge it on the stock option market. This changed with the advent of convertible arbitrage funds.

Testing. Chart 16 shows the difference between the implied vol on 86 European convertible issues versus the higher OTC vol on their shares, since 2000. For each issue, we take the implied volatility of the equity that comes from the price of the convertible (as reported in IFR), and compare it with our own estimate of long-term OTC equity volatility on the stock. Units are vegas.

... but the easiest opportunities are not there anymore

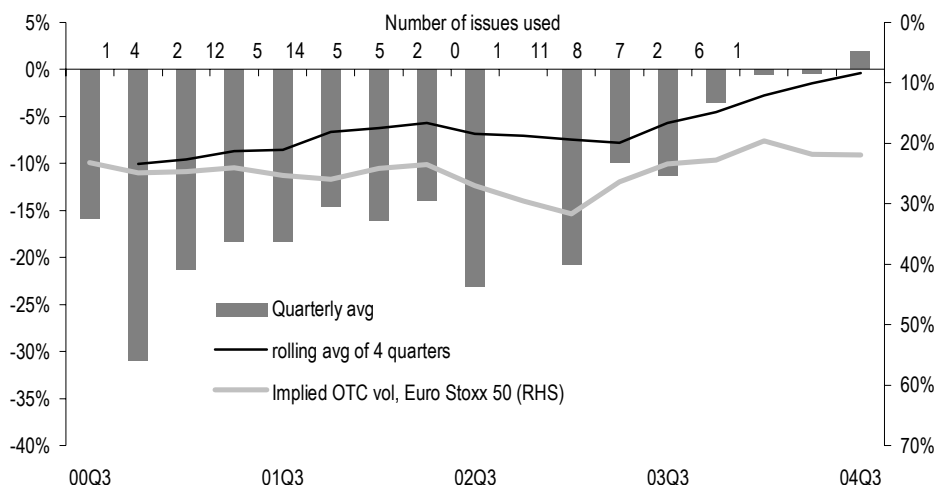
In short. Over time, the difference between these volatilities have come down, particularly over the last year, and this opportunity has been reduced. This is not too surprising given that hedge funds seem to account for about around 70% of the convertible business, in both Europe and the US (according to a recent Greenwich Associates Survey – July 2004). This is probably also driven by the fact that overall volatility has decreased (a cyclical element).

6. Mispricings in options

Options offer good opportunities, because of segmentation

The options market is especially open to mispricings as there remain significant restrictions on who can use what option for what purposes. Hedge funds systematically use mispricings along the volatility surfaces, and across options on related underlying assets to find relative value. Both structural and temporary relative mispricings in options form a rich vein of added value for hedge funds.¹⁷ In the interest of brevity, we present two typical examples that hedge funds have been exploiting.

Chart 16: Difference between convertible implied volatility and OTC equity volatility



Source: JPMorgan.

17. These relative value opportunities in volatility markets are the bread and butter of many of the trade recommendations our strategists present. See *US Fixed Income Markets Weekly* (Terry Belton and Hussein Malik), Kamran Moghadam in *Global Markets Outlook and Strategy*, and Peter Allen in *European Equity Derivative Weekly*.

Swaption volatilities look cheap to bond vols

Opportunity 1. Options on government bond futures versus options on swaps (swaptions). Swap rates are historically more volatile than government bond yields as the swap spread tends to be directional, particularly in the US market, typically widening as government yields rise.

But swaption volatilities are frequently at equivalent levels to bond volatilities, despite the higher historical volatility in swap rates, as shown in Chart 17.

Segmentation 1: Many investors cannot use options, and among those who can use swaps, many cannot use swaptions.

Testing 1. Chart 17 shows the difference between the volatility on 5-year US yields (swaps minus bonds) in both implied and delivered. The delivered historical volatility of 5-year US swap rates has been 0.38bp a day higher than in bonds since 1996, and the difference has been growing. Conversely, the implied swaption vol has been 0.34bp a day lower than implied bond vol, although over the past few years, the two have been trading close to each other. Importantly, the gap between implied and historical has been widening, indicating that this relative value opportunity has not been arbitrated away yet (to the contrary).

Diversion trades in equity volatility markets

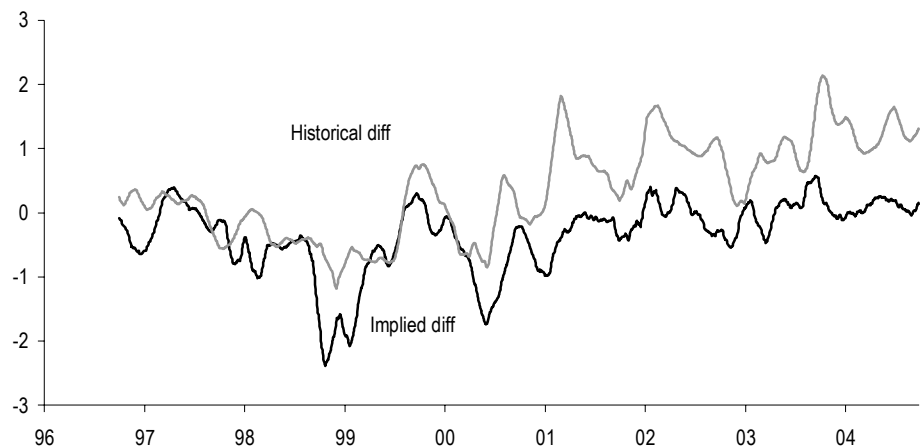
Opportunity 2. Hedge funds have been looking at the gap between the implied volatility in equity indices and those of the stocks that make up these indices. The two should be related through the implied correlation across these individual shares.

Segmentation 2: Index volatility has been pushed up by buyers of portfolio protection, among which the many managers of retail capital guaranteed equity funds. Options on individual shares have been driven more by covered call writing. This has pushed implied index vol above that of its constituents.

Testing 2: Hedge funds have been arbitraging this difference in vols by selling index vol and buying baskets of options on constituent stocks. Chart 18 shows how for the Euro Stoxx 50 index, the difference between implied and delivered correlation has diminished through time, and hence the profitability of these dispersion trades. While opportunities still exist (and have picked up more recently), this mispricing has diminished through time.

Chart 17: US swap minus bond volatility in 5-year: implied and historical (250-day)

basis points per day, 40-day moving averages



Source: JPMorgan.

Exploiting market opportunities over time

The first section on the impact of hedge funds on market opportunities related to their exploitation of structurally high risk premia. In the following section, we look at the impact of their trying to exploit temporary mispricings in markets: that is, their attempt to call market direction, or price differences across assets and markets.

1. Directional trading in equities, bonds, credit and FX: the momentum test

Momentum is the ultimate directional force, and the first test of market efficiency

Momentum is brought on by slow adjustment in portfolios ...

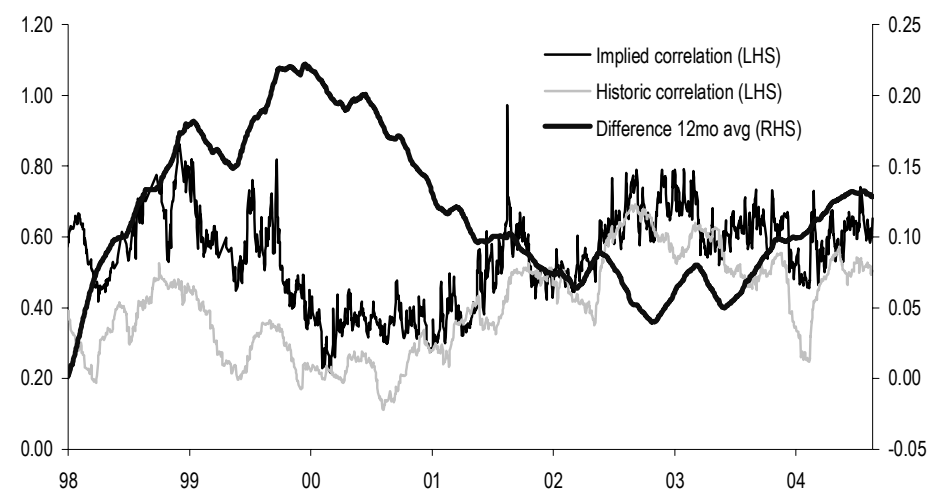
... or in views

The opportunity. Hedge funds and active managers continuously try to use all relevant information to gauge market direction. If they do this very well, and put enough capital into it, then markets should instantaneously price in all new information.¹⁸ Informationally efficient markets will thus cease to be correlated over time as they always price in new information. But there is strong evidence that market returns do exhibit trending behavior.¹⁹

Segmentation. Momentum in markets exists largely due to the inability or unwillingness of most investors to flexibly change their views and/or their positions. This can be due to organizational or operational constraints on their investment portfolios, or innate conservatism in adjusting views. If hedge funds can adjust their portfolios more speedily, and/or change their views more flexibly, then they should be able to exploit this momentum in markets. If they do so with enough capital, then they will ultimately erode any momentum in markets, making it again behave like the textbook case of a random walk.

Testing. To test this in a set of markets, we pursue a simple strategy of buying each month a market that has rallied against cash, and selling it when it has underperformed cash over the previous month. Chart 19 shows the return to risk (information ratios) of pursuing this strategy in US Treasuries (2s, 5s, 10, and 30s) as well as on the UST curve (5s/10s, and 10/30s). It shows this for two periods: 1986-

Chart 18: Implied and actual correlations on shares in Euro Stoxx 50 index



Source: JPMorgan.

18. It is known in the Theory of Finance that markets may deviate from equilibrium merely because hedge funds have short investment horizons and capital constraints that prevent them from staying for long in losing positions, even if they eventually prove right. See Andrei Schleifer and Robert Vishny, *The limits of arbitrage*, *Journal of Finance*, 1997, pp. 35-55.

19. For a recent survey for equities, see *Momentum investing: a survey*, Laurent Swinkels, *Journal of Asset Management*, pp. 120 - 143, August 2004.

Momentum remains alive in bond prices, but not in curves

96 during which hedge funds are assumed not to have been dominant yet, and 1997-2004, during which hedge funds are assumed to have become much more dominant. The results show that momentum in bond prices is positive, and that it has not been eroded in recent years. Momentum in curves is extremely weak, but was never strong to start with.

Good momentum in floating currencies and in high-yield ...

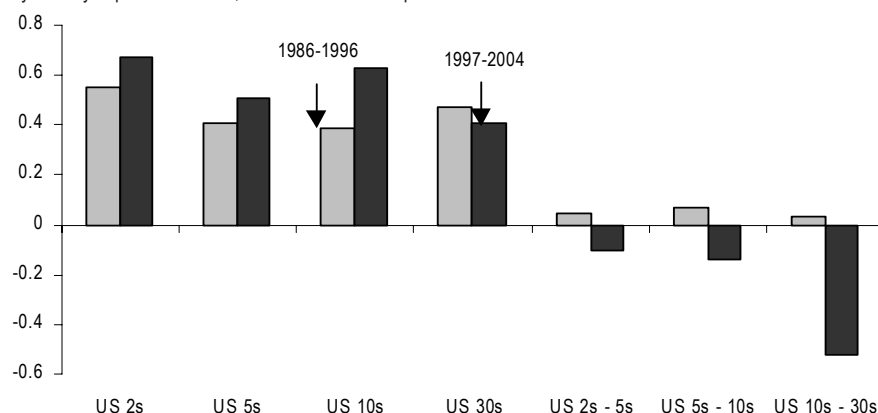
Chart 20 performs the same tests for equities (S&P500 and Nasdaq), currencies (dollar euro and dollar yen), and credit markets. It shows that equity indices have become much more efficiently priced in recent years in that there is almost no momentum left. Currencies show a more interesting picture. A freely floating currency like EUR/USD continues to show momentum and this has not changed in recent years. A currency like dollar/yen, subject to significant intervention, has flipped from positive to negative momentum (i.e., mean reversion), most likely because actual or expected intervention sustains a currency within a broad range.

... but not in equities or high-grade

In spread product, we find much reduced momentum in the highest grade (a substitute for the swap spread), and in BBB's, but continued high momentum in high-yield spreads.

Chart 19 Information ratios on monthly momentum trades on bond levels and curves

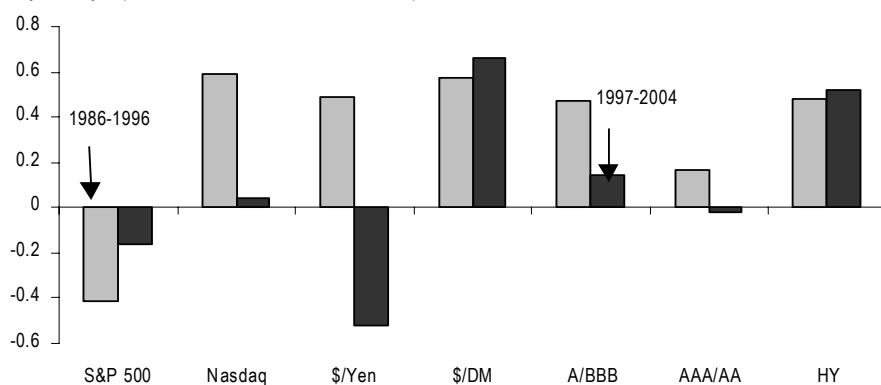
Buy on rally in previous month, and sell on selloff in previous month.



Source: JPMorgan.

Chart 20: Information ratios on monthly momentum trades on equities, FX, and credit

Buy on rally in previous month, and sell on selloff in previous month.



Source: JPMorgan.

In short, momentum is alive and well in bond prices, floating currencies and high-yield, but not in equity indices, curves or high-grade credit. Note, however, that momentum this year has been limited, probably because the underlying momentum in economic data has been limited.

2. Relative value in stocks

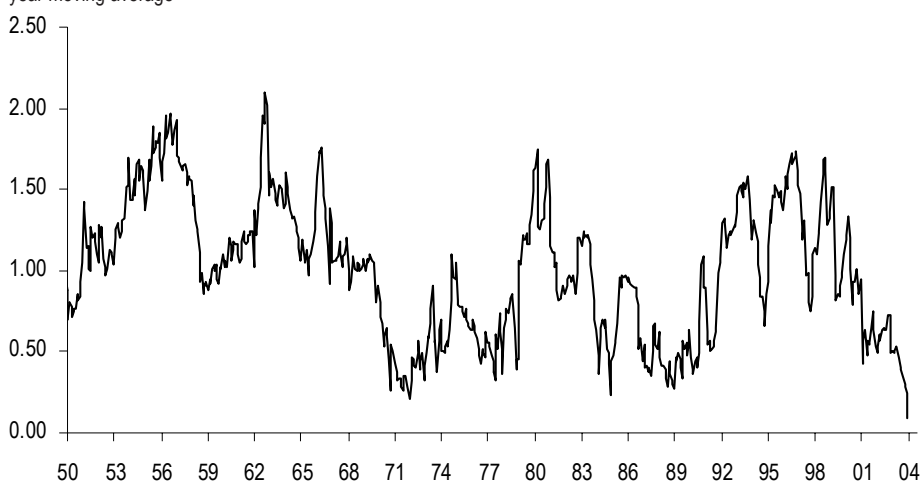
The opportunity. About a third of hedge fund AUM is based on picking cheap stocks or equity sectors against expensive ones. The first hedge funds 50 years ago focused on this strategy. These hedge funds use a multitude of fundamentals and quantitative techniques to assess value. They are not that different from traditional equity managers except that they can use leverage, outright shorts and options. The basic premise of their approach is that the concentrated application of value and quantitative techniques should allow hedge funds to discover value faster and better than other, long-only funds.

There is little momentum left at the single stock level

Testing. To test whether they have arbitrated away relative value opportunities in equities, we look at the momentum in individual shares and the correlations between sectors and countries. If hedge funds and other active managers are fast in pricing in new information on individual companies, then their relative share prices should produce little momentum. Relative prices should be a random walk. Chart 21 shows the return to risk (information ratio) of buying each month the top 30% NYSE performers over the past year and selling the bottom 30% performers.²⁰ These information ratios have been calculated on a 4-year rolling average. Over the past 50 years, the implied momentum trade never lost money on any 4-year period and earned 10% a year. However, in the 4 years just ended, which saw the most aggressive hedge fund activity in equities, momentum has clearly died, indicating the company information now gets priced into share prices much faster than before.

Chart 21: Information ratio on momentum in NYSE shares

Return-to-risk of buying each month the top 30% NYSE performers over past year and selling bottom performers, 4-year moving average



Source: JPMorgan.

20. These returns are not adjusted for transaction costs. However, the objective is to test not whether momentum trades are working, but whether the value-discovering activity of hedge funds and other active managers is assuring that share prices now more quickly price in such information, thus reducing the opportunities for other investors to benefit from this same information.

Caveat: Finding relative value opportunities is also affected by overall volatility in the market as well as the market direction. Charts 22 and 23 show that the momentum information ratio falls with the return on equities and the rise in volatility. Low-vol rallies creates best momentum and thus the most time to ride a relative value opportunity.

In short, even adjusted for the high-vol bear market we have been in over the past 4 years, the momentum on individual shares has clearly fallen, thus indicating that hedge funds and other active equity managers are indeed making markets more efficient and thus harder to find lasting relative value opportunities in stocks.

3. Positioning along the yield curve

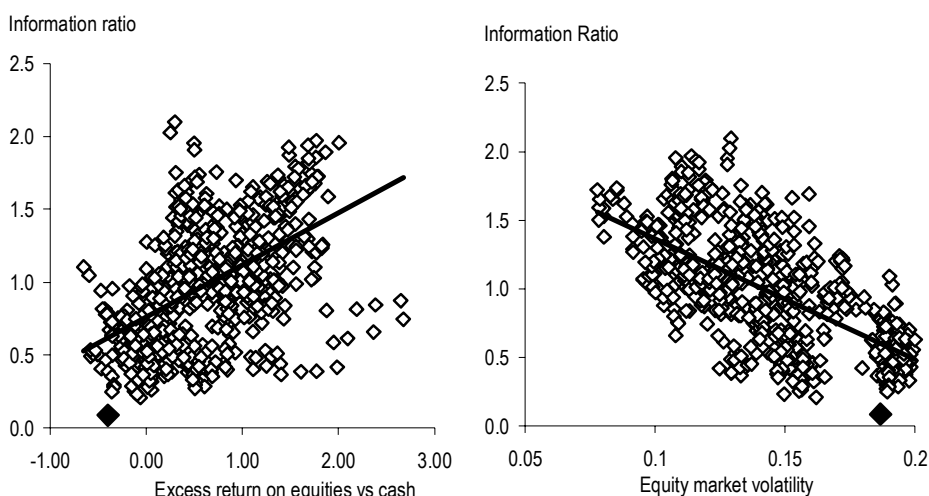
AUM in global and Fixed income funds has doubled since 2001...

The opportunity. Participants in the interest rate market—most prominently banks and hedge funds—have over the years sought excess returns from arbitraging mispricings along the yield curve.²¹ This involves buying and selling similar instruments in the same currency, but with different maturities. One such set of opportunities is temporary deviations in the yield on individual bonds and points on the swap curve from the rest of the curve. Participants benefit from these by buying the higher-yielding rates and shorting neighboring, lower-yielding rates on the curve. A second type of opportunities arises when one part of the curve has moved away from the relationship it has typically held with other parts of the curve. We look at both.

Testing 1. One way to measure whether market participants have succeeded in picking up mispricings of individual bonds or points along the yield curve is to test whether various segments of the curve have become more correlated to each other. The more they move smoothly in line, the less nonmarket directional trading opportunities (mispricings) there will be, other things being equal.

Chart 22 - 23: US stock momentum information ratio against equity excess return and volatility

Monthly data since 1950 (4-year moving averages), last observation as black diamond



Source: Kenneth French - University of Chicago, JPMorgan.

21. Yield curve trading is mainly conducted in the derivatives markets, in either outright futures, swaps, or options (the latter allowing contingent plays). These strategies are typically conducted by hedge funds categorized under both Fixed Income Arbitrage and Global Macro, although both categories also include funds which are active in other segments of the fixed income markets. We estimate that these funds have in excess of \$200bn under management now, up from less than \$100bn at the end of 2001, with a similar increase for both types of funds.

The moves in yield curves are increasingly smooth...

We look at the yield curve by splitting it into a strip of forward rates: 1-year rates from 0 out to 10-year, then 2-year 10-year forwards, then 3-year 12-year forwards, then 5-year intervals out to 30-year. Splitting the curve this way into forward gaps is how swap market makers typically look at, and price, the yield curve: having a smooth forward curve will ensure that the resulting spot curve will be very smooth as well. We then look at how each of these forwards is correlated to the one next to it over a 30-day period, and taken the average of these R^2 across the yield curve for each day since 1998. For presentational reasons, we have then smoothed the data, taking the average of these average daily R^2 over the past 250 days (Chart 24). The higher the average correlation, the more correlated the different segments of the curve are and likely, the lesser idiosyncratic any mispricings there will be.

... more so in the Euro area...

The chart shows that some markets have always been moving more smoothly than others. This is particularly the case of the **Euro market**, with average correlations in excess of 0.80 over the past few years. Historically, EMU convergence trades from the mid-1990s onwards have forced traders to think in terms of forwards. This, and the absence of large and regular shocks (like the ones originating from the mortgage market in the US) have insured that the Euro curve has always been smoother than the US curve.

... than in the US

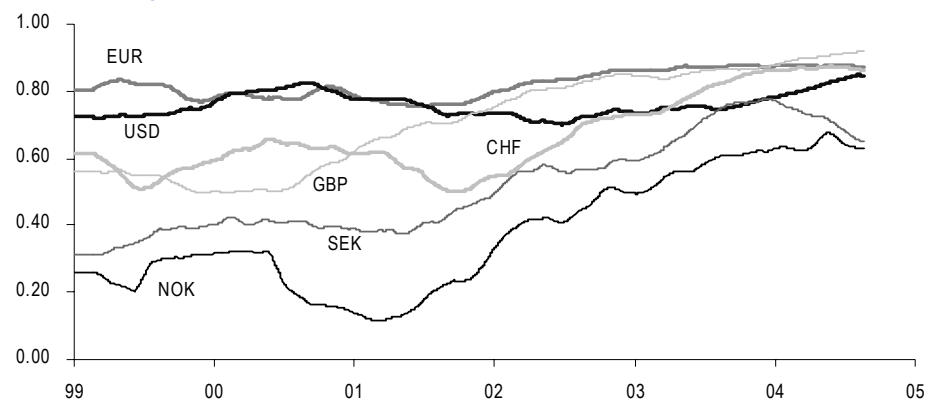
The US curve has itself become smoother in recent years: it has been similarly highly correlated before, but that was at a time when the whole curve was at a very flat level, which makes it easier for the various segments of the curve to be correlated. Currently, the curve is fairly steep, but the various segments nevertheless are very well correlated to each other. Indeed, there are still far fewer people who trade the US curve in forward space than the curves in Europe. As a result, relative value opportunities in these forwards will be more frequent (but liquidity will likely be more limited). Also, the US curve tends to be more impacted by external supply/demand shocks, which will by themselves generate more yield curve trading opportunities and relative value opportunities.

But it is especially the case for the smaller markets

There has an overall increase and convergence in the average curve correlations across **other countries**, with the “smaller” countries showing the biggest improvements. This is the case for the GBP, SEK, CAD and NOK curves (and doubtless other markets we have not tested, like emerging Europe).

Testing 2: Another way we can assess opportunities on the curve is to look at the returns from trading yield curve spreads vs some of their key drivers. We tested the

Chart 24: Average R^2 between successive forward rates in various currencies



Source: JPMorgan.

Yield curves are moving in more predictable fashion

relationships between the 2s/5s curve and the spread between 3-month rates 2-year forward and 3-month rates 1-year forward; and between the 5s/10s or 10s/30s curve and the level of 2-year rate. For different reference periods, we looked at the residual of the regressions between these. If the residual was more than 3bp, we initiated a trade (using the regression beta for weighting the trades). We closed the trade either when the residual moved back to 0; when the trade moved further away by 3bp (stop-loss); or after a month (if little had changed).

Table 6 shows the results of such strategies in two periods since 1994, using a reference period for the regressions of 2 years (but results are similar for shorter reference periods). On average such strategies produce small positive returns, but likely not sufficient to cover transaction costs for most. At the margin, such strategies were more successful in the 94-99 period (especially for 2s/5s in the US).

Yield curves have become more directional and move with monetary policy

In short, this suggests that the yield curves tend to move in a smoother and more predictable way than before, at least for now. In a way, yield curves are to a large extent driven by monetary policy expectations, and putting on yield curve trades is generally a substitute to putting on trades at the short end of the curve, even if there can be some small advantages to doing one or the other (in terms of valuation, changes in regimes, carry and slide, convexity, etc.).

Relative value opportunities better in markets where hedge funds are less dominant...

These results do not mean that there are no opportunities trading yield curves anymore, or that there will not be in the future. For one, these tests are not sophisticated enough to pick up micro relative value trades on the curve. True relative value trades tend to be small and short-lived in established, liquid, markets like developed bond and swap markets. In addition, the more there are external supply/demand factors at play and hedge funds are small relative to other players, the more there will be opportunities. In that respect, in pure interest rate markets, the US probably still offers more opportunities than the Euro markets.

Table 6: Returns from trading yield curve spreads

Period		USD			EUR		
		2s/5s	5s/10s	10s/30s	2s/5s	5s/10s	10s/30s
94-04	P&L	5.18	2.79	0.76	9.51	4.47	-1.25
	# trades	573	297	421	926	647	473
	P&L per trade	0.01	0.01	0.00	0.01	0.01	-0.00
94-99	P&L	4.89	0.82	0.01	6.89	3.06	-0.34
	# trades	181	103	115	500	298	48
	P&L per trade	0.03	0.01	0.00	0.01	0.01	-0.01
99-04	P&L	0.29	1.96	0.73	2.62	1.41	-0.91
	# trades	392	194	305	426	349	425
	P&L per trade	0.00	0.01	0.00	0.01	0.00	-0.00

Source: JPMorgan.

... and in new markets

Further, the development of new products (e.g., inflation-linked assets) or techniques to analyze the curve will also ensure that there are new opportunities, even if they are not the ones we know and exploit currently.²² An area of great interest is the relationship between the past yield curve moves and what is implied by the option markets at each point in time. Relative value trading on the yield curves is far from over, but it is becoming more complex than before.

4. Opportunities across national interest rate markets

The opportunity. During the 1990s a large part of excess returns earned by bond managers and hedge funds was from trading one market against another. Funds generally found that these spreads moved with macro fundamentals and currency movements, and were global in nature.

Interest rate markets used to be segmented

Segmentation. Up until 5-10 years ago, most investors were constrained in their ability to diversify into foreign markets. Hedge funds did not have this constraint. More recently, the advent of Monetary Union in Europe and the removal of capital controls have allowed greater integration of markets. The importance of global players has increased, to the detriment of local players.

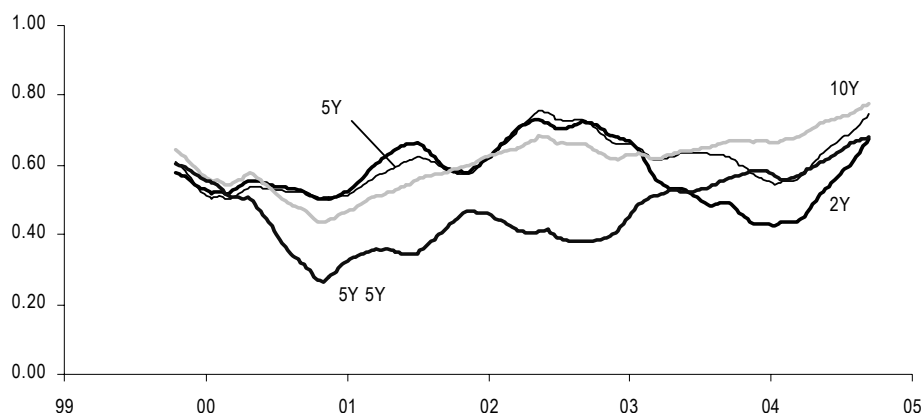
US markets lead the world, but this is probably partly cyclical

Testing. One way to assess cross-market opportunities is to look at how the correlation between yield moves in different maturities have evolved over time (see Chart 25). For spreads between the **US versus Canada and Euro**, there does not seem to have been a systematic increase in the average R^2 between weekly yield moves. Over the past two years, the correlation between US and Euro rates has increased across all maturities, to very high levels (0.8 or so), although part of this can probably be explained by the more aligned business cycles between the two.

Reduced opportunities in European cross-market spread trades

For spreads between the **Euro area versus the UK, Sweden, Norway or Switzerland** (see Chart 26), the R^2 s have, in contrast, clearly increased from before, to an average level of 0.7 in the past few years from below 0.5 in the years around the turn

Chart 25: Average R^2 between weekly yield changes in US and Euro and Canada



Source: JPMorgan.

22. Swaps spreads have been quite tight and relatively stable in the past few years, mainly because budget deficits (their key driver, with the direction of the market and the mortgage market in the US) have ballooned and show little signs of decreasing. The dynamics and drivers of swap spreads are much better known now than they were before, and positions have tended to be clustered in certain trades. This has increased the relative lack of opportunity on that side. Repo opportunities have been less frequent, because the low absolute level of short rates limits the potential gains (in the absence of negative repo rates), and because bond issuing authorities have tried to improve the efficiency of their bond markets (making issuance more transparent, broadening reporting requirements, increasing liquidity, etc.). Similarly, future basis trade opportunities have been more rare over the past few years, for the same reasons as repo opportunities have been rare.

of the millennium. As expected, these correlations are systematically the lowest in the short end of the curve, where monetary policy is more relevant. But 10-year rates (and 5-year 5-year forward rates) in Europe are overall much more driven by Euro rates (and hence US rates as well) than before.

Intra euro cross market spreads have experienced extremely low volatility, since the advent of EMU. Even rating actions have had a limited impact on relative value. This is likely to continue, as a convergence in macro-policies has removed a lot of the risks in holding different EMU countries government bonds, and electronic trading have increased the liquidity of the various markets.

Cross market spreads opportunity remain... but more at the short end

In short, the idiosyncratic moves in the cross market spreads and curves that happened before have been reduced,²³ and domestic factors are not as important as before in driving the long end of European curves. This means that there are also probably reduced cross market opportunities on the European side.

5. Opportunities in volatility

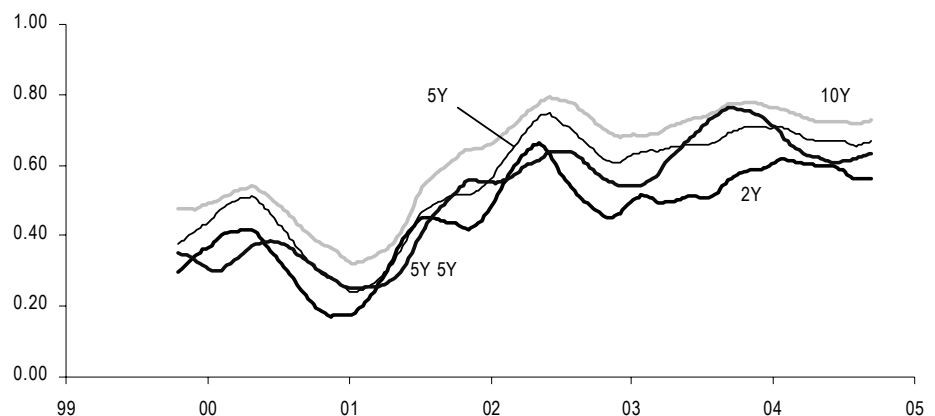
Option markets are used very extensively by hedge funds. They exploit differences in implied volatilities across markets and relative to the underlying markets (or simply, to position their underlying view cheaply).

Opportunity: Anomalous movements in correlations **along the curve**.

Volatility curve moves are less smooth than in underlying markets

Testing. Chart 27 looks at the correlation between four different points on the volatility grid. Over time, there has been an increase in correlation on the volatility surface, especially for the smaller countries. But overall, the volatility curves move in a way that is less smooth than the underlying yield curve, and thus look like providing better opportunities than outright directional or curve trades. Likely, this is due to the fact that there are more supply and demand factors at play in the option markets (insurance companies and pensions funds in Europe, mortgage players in the US, etc.), and that the options markets are less liquid than the underlying markets.

Chart 26: Average R² between weekly yield changes in Euro versus GBP, SEK, NOK, and CHF



Source: JPMorgan.

23. We have a similar experience in trading across EM markets. Stuart Scalter-Booth discusses in "Whither relative value?: Part 2", Sep 20, how intra-credit spreads RV opportunities have increasingly disappeared, and inter-credit RV is very tight also. But new valuation techniques, such as implied default probabilities, do still offer some opportunities.

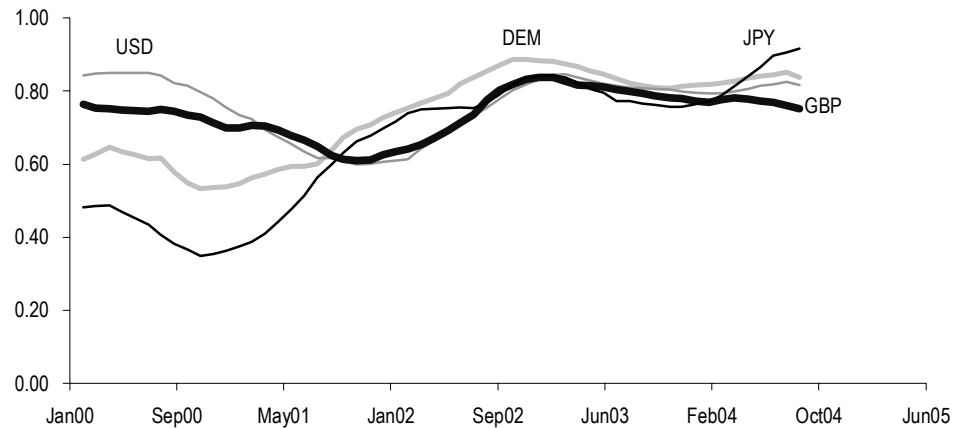
6. Fat tails in markets

Almost no fat tails left in markets

The opportunity. When markets are inefficient, they frequently overshoot, producing “fat tails” in returns. Fat tails are a return pattern that shows a higher frequency of high standard deviation returns than can be expected in normally distributed markets. This may be merely the result of out-of-the-ordinary shocks hitting the financial system, but it might also be brought on by “overshooting” markets. To the extent that hedge funds are less subject to the behavioral patterns that cause overshooting (a big if), they should be able to exploit overshooting markets, in the process reducing the occurrence of outlier events.

Testing. Chart 28 depicts the kurtosis measure of fat tails (deviations from normal distributions) in US equity and bond markets. It shows that in the last five years, this kurtosis has almost totally disappeared in US markets, despite a rise in market volatility during the period.

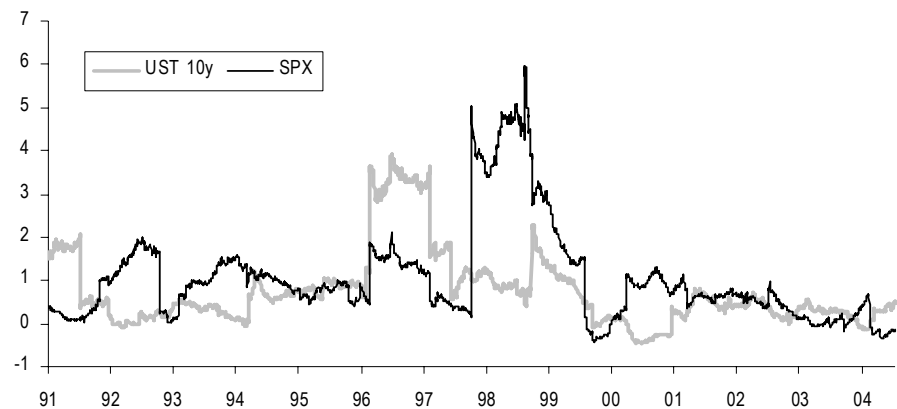
Chart 27: Average R^2 between points on the volatility curve



Source: JPMorgan

Chart 28: Fat tails (kurtosis) in bond and equity returns

Ratio, excess over normal distribution (=3), based on daily returns



Source: JPMorgan.

7. Directional models in FX

The opportunity. Many hedge funds use a variety of quantitative signalling models that allow them to gauge market direction which they leverage to earn high returns to risk. These models are most prevalent among FX funds. These models typically screen market and economic information and is tested for their momentum or contrarian value.

Segmentation. See above under FX forward bias.

JPMorgan's FX Barometer: a family of directional trading signals

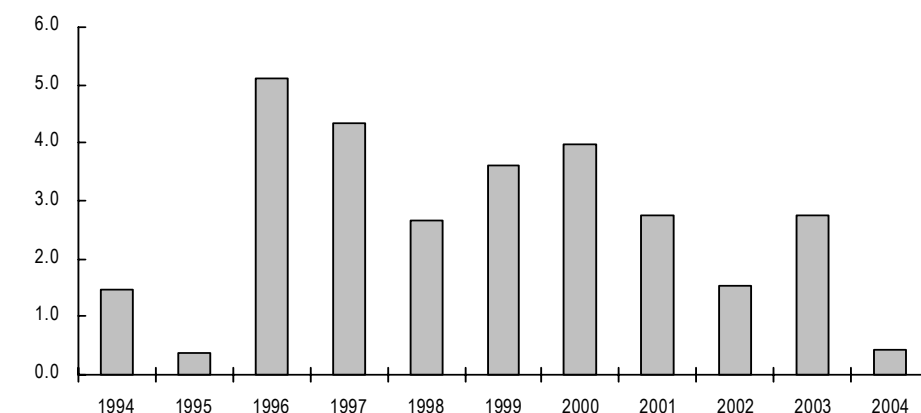
Testing. We ourselves have built similar models to those used by hedge funds. This month, we have launched our new *FX and Commodity Barometer*, which brings together 10 directional signals to anticipate G10 exchange rate movements.²⁴ The ten signals consist of forward carry (changes in bond yields), our US Economic Activity Surprise Index, changes in consensus forecasts on economic growth, equity return differentials, IMM positions, risk reversals, Carry-to-Risk, moving-average crossover rules, portfolio flows, and our own index of speculative FX positions. Chart 29 shows the annual return to risk on a portfolio of these signals for 10 currency pairs. For the whole period, the return to risk, taking transaction costs into account, was a very high 2.1. Over the period, there would appear to be a gentle downward trend, but it is largely a function of the low return so far this year.

New rules and proprietary information do best

Older rules are losing some of their potency

Chart 30 shows the return-to-risk on the 10 individual signals over two sub-periods: 1994-98 and 1999-2004. It shows that the overall portfolio of signals has lost some potency, with the information ratio falling from a massive 3.5 to a still very high 2.0 (before transaction costs). Looking at the individual signals, we find that six lost potency, while four gained. What differentiates the gainers from the losers is that the losers are generally the older, better known signals, while the gainers are mostly newer, and much less well known in markets. Two of the gainers are based on proprietary information to JPMorgan (speculative positions and portfolio flows) while a third (Carry-to-Risk) had not been made public yet until this month. Only the fourth gainer—the MA cross-over rule—is generally known and used by investors. The six losers, in contrast, are all signals that have been well known in markets: IMM and Risk reversals have been known for years and have had little value in projecting currencies in the past five years. Similarly for the momentum in growth expectations.

Chart 29: Information Ratios on directional FX trading signals in JPMorgan's FX Barometer 1994-2004



Source: JPMorgan

24. For details, see John Normand et al, *JPMorgan's FX and Commodity Barometer*, Sep. 22, 2004.

Except for the momentum rule

The one signal among the losers that remains high in information ratio is what we call forward carry, or the change in bond yield spreads. This is again a signal we have not made public before.

In short, we find that older, better known directional signals have started to lose some if not all of their potency, while newer, or proprietary signals retain most of their potency. Overall, the complete set of signals, while somewhat down in return to risk, retains a market-beating impact on currency returns.

Conclusions

1. Summary of findings

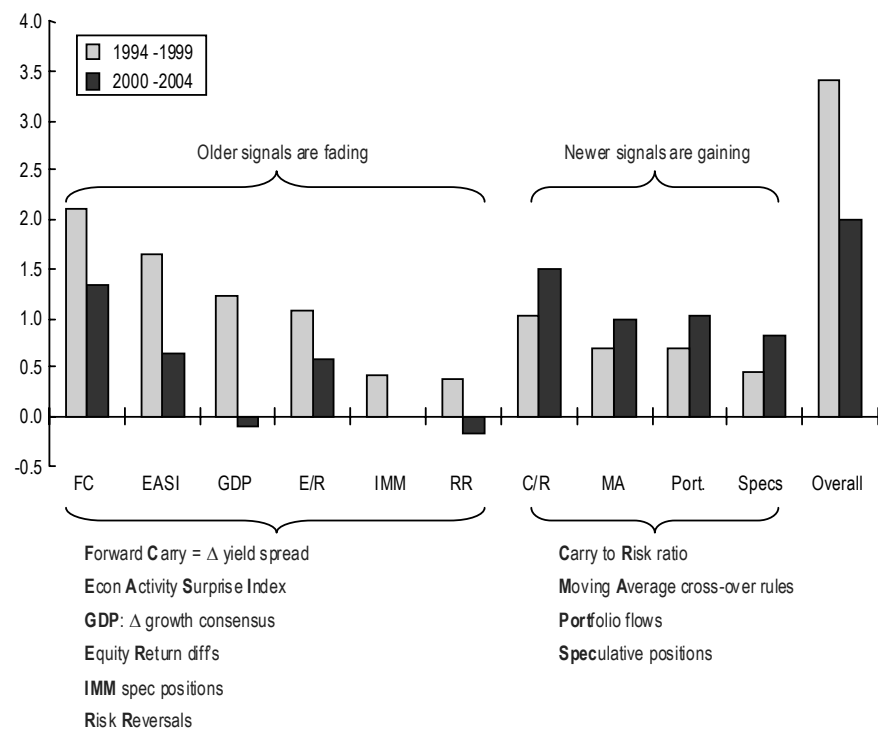
As we review the market opportunities and inefficiencies that hedge funds have been trying to exploit in interest rate, credit, currency, and equity markets, we find that market opportunities have been eroded most in the areas where we have seen the most hedge funds (or hedge fund like) activity: equities, and interest rate markets. Opportunities remain alive in areas where there are few hedge funds (credit) or where they remain small against world capital flows (FX).

We find that trading rules that have been well known and where hedge funds are deploying ample capital, are becoming less profitable. Investment techniques that rely on proprietary information or that have only been introduced recently, are still performing fine.

Opportunities in the rate markets eroded somewhat ...

In the **rate markets**, it is more in the traditional yield curve and cross market spread trading areas where the going got harder, and easy relative value opportunities have been eroded. Important for macro hedge funds that are active in money markets is

Chart 30: Information Ratios on directional FX trading signals in JPMorgan's FX Barometer



Source: JPMorgan

... but relative value is getting more complex

that the excess term premium at the short end of the curve has been eliminated. Relative value is becoming more and more complex: it requires new models and sophisticated analysis, and increasingly will need to be played in the volatility markets, or new markets and products (like linkers). Relative value remains also more attractive where there are more supply/demand shocks (e.g., the US rate market), and hedge funds are relatively small vs other players. Next to the pure RV opportunities, directional opportunities will remain, as the rate markets still exhibit momentum.

Credit markets still offer plenty of opportunities

Opportunities in **credit** markets remain ample: both the excess return on BB-rated bonds and on short-term credit remain in place. High-yield continues to show good momentum. Credit has so far not been fully arbitrated yet as derivatives have not yet permeated the credit world. But CDOs and CDS are steadily growing and will soon create the liquidity needed for hedge funds and other participants in the credit world to fully exploit, and eventually eliminate, credit mispricings.

The easier opportunities have gone in equities

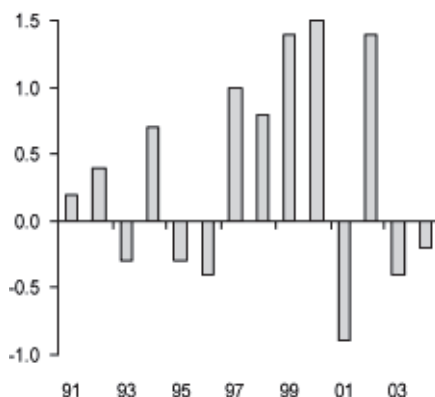
On the **equities** side, we find that momentum at the single stock level and index level have disappeared. Similarly, performance at the industrial sector level is now much more globalized than before. As elsewhere, the easier opportunities have been eroded: convertible arbitrage, index inclusion trades and dispersion trading are showing smaller returns, if any, than before. Saying that, hedge funds remain relatively small vs the other players, and this should ensure that opportunities remain.

FX still good for active investing, but innovation is key

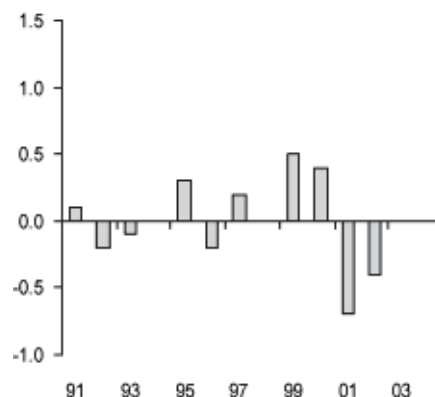
Currencies continue to offer good opportunities for active investing. Hedge funds are very active here but even their size is dwarfed by the size of global capital flows. In addition, the great diversity of objectives of the different investors, corporations, and governments who are active in currencies makes this market ripe for attractive risk-return opportunities. That said, some of the easy pickings on well known trading rules have been arbitrated away. Importantly, though, the most basic inefficiencies in currencies—the carry trade and the momentum trade—remain intact.

Chart 31: Change in Consensus US GDP Forecasts in August from start of year

Forecast for current year



Forecast for the year ahead



Source: Consensus Economics, JPMorgan

2004 is a most difficult year

The consensus view on growth has barely budged this year

2. 2004: harbinger of what is to come?

This year has so far been a bad year for active investing. The hedge funds industry has returned barely positive returns. Trading revenues at investment banks have come off. Our own *GMOS* model portfolio is down on the year. And our FX Barometer has also underperformed against previous years (although it has modest profits). Markets are showing no momentum. All this is raising fears that hedge funds have now finally reached the size where they have eliminated most active opportunities.

We think it is too early to write off hedge funds. The year 2004 is almost a perfect storm hitting alpha for active investors. For one, the business cycle itself has offered little momentum, leaving investors in the dark on the likely strength of the global recovery. So far this year, consensus forecasts on US growth have been in a much tighter range than they have been in the past. Chart 31 shows the change in consensus views on US growth for this year and next, compared to changes in consensus views over the same Jan-Aug periods in previous years. It shows the change in growth views this year matches the lowest changes in the previous 12 years.

Secondly, we find that most spread markets are close to fair value this year and that the cyclical factors imply little movement in these spreads this coming year.²⁵

This lack of any major change in economic views has lowered volatility in bonds and equities, and has killed off momentum in markets. Low volatility, high correlation in markets (as all markets focus on the same global issue), and the new lows in credit spreads reached this year all collude to prevent the emergence of momentum or large mispricing opportunities.

25. See Jan Loeys, Valuation tools for deflation, forthcoming, Oct 2004.

Have hedge funds eroded market opportunities?

Structurally high risk premia

- | | |
|--------------------------------|--|
| • Term premia at the short end | Excess premium is largely gone |
| • Credit spreads at short end | Excess spread is still there, but wider use of CDS will likely erode it |
| • BB rated credits | Excess spread on BBs is still there, although it is now low for cyclical reasons |
| • FX carry | Alive and kicking in both G10 and EM, though weak this year |
| • Equity anomalies | Most well-known anomalies have been exploited |
| • Option volatility | Some opportunities have been arbitrated, but still a fertile ground for relative value |

Opportunities across time

- | | |
|----------------------------|--|
| • Macro momentum | Largely gone in equities and curves, but still there in interest rates, high-yield, EM and FX (even if weak this year) |
| • Relative value in stocks | Momentum in stocks died over past 4 years, partly due to high-vol bear market, but also as stocks now price in new information much faster |
| • Yield curve trades | The more basic relative value has been eroded, but new opportunities in volatility markets |
| • Country bond spreads | Easier opportunities eroded, though largely due to correlation in growth and policies |
| • Volatility | Good relative value opportunities still available, as markets are more segmented |
| • Overshooting (Fat tails) | Greatly reduced in recent years |
| • FX trading models | Best known rules have been arbitrated, but basic carry, momentum and use of proprietary information still work well |

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