

September 2010

## Interest Rate Strategy

Global

### Portfolio Diversification and Alpha Enhancement Through Inflation Products

Morgan Stanley & Co. International plc+  
**Anton Heese**  
anton.heese@morganstanley.com  
+44 20 7677 6951

Morgan Stanley does and seeks to do business with companies covered in Morgan Stanley Research. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of Morgan Stanley Research. Investors should consider Morgan Stanley Research as only a single factor in making their investment decision.

**For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.**

+ = Analysts employed by non-U.S. affiliates are not registered with FINRA, may not be associated persons of the member and may not be subject to NASD/NYSE restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account.

## Summary

---

- **TIPS have been a high-risk, high-return asset**

- This is in contrast to initial expectations when the market was launched
- They have performed poorly as a “safe haven” asset during crises
- But returns have been higher than those of most other assets over the last 10 years because:
  - the TIPS universe is very long duration
  - the market appears to have systematically under-priced inflation

- **Portfolio diversification argument has declined in recent years**

- Before 2008, using realised co-variances and the same risk-adjusted returns across assets would have led one to conclude it made sense to own a lot of TIPS in a fixed income, or multi asset, portfolio for diversification purposes
- However, recent performance data have weakened this argument, as TIPS returns have been too highly correlated with risky assets
- If one expects correlations to stay the same, it would only make sense to own TIPS (rather than USTs) as one would expect them to deliver higher risk-adjusted returns

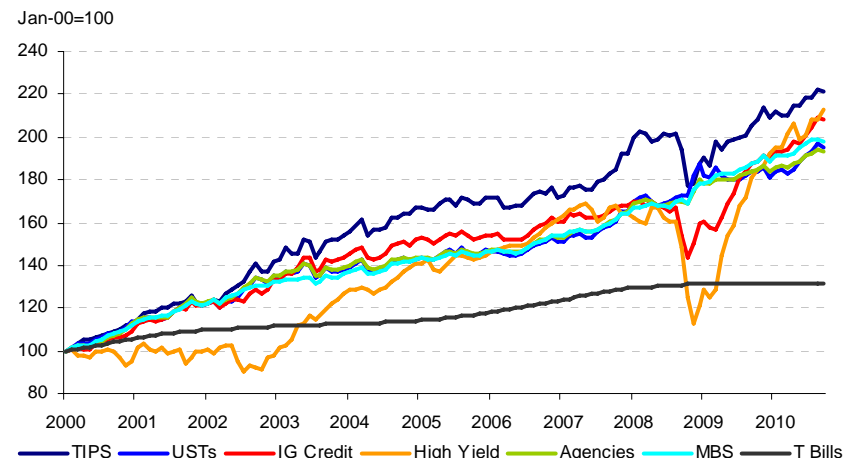
- **TIPS directionality with macro data and other asset prices creates trading opportunities**

- Returns on TIPS are higher when ISM is above 50, CPI is above average and equity & oil returns are positive
- We use these relationships to build a simple model for trading TIPS breakevens. Back-tests suggest it is a useful approach

# TIPS: A (surprisingly) high return asset

- When the TIPS market was initially launched, many commentators thought it would be the ultimate low-risk asset. Investors were expected to pay up for the inflation protection, and hence returns would be lower than for conventional USTs.
- However, this has not been the case:
  - TIPS have not commanded a premium (especially in a crisis)
  - Their returns have been more volatile than those of USTs
  - Their returns have been higher than USTs and most major asset classes
  - They have been very competitive on a risk-adjusted (Sharpe ratio) basis

US fixed income returns: Jan-00-Aug-10



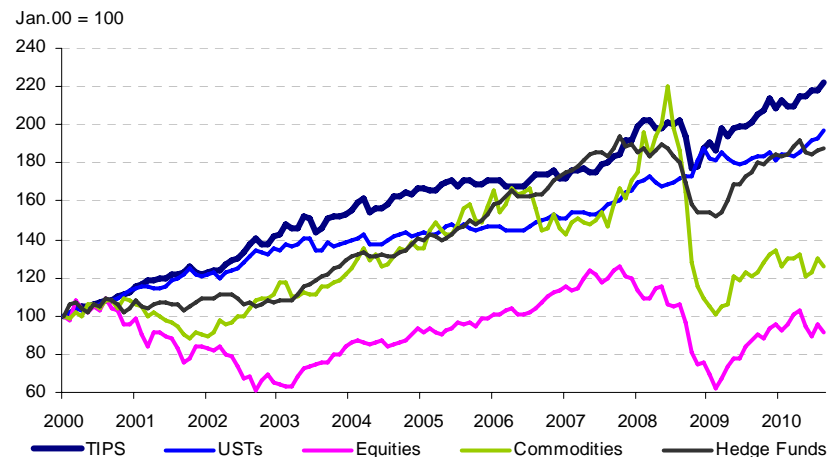
Source: Morgan Stanley Research, Bloomberg.

## Realised Excess Returns & Sharpe Ratios

	TIPS	USTs	IG Credit	High Yield	Agencies	MBS	Equities	CRB Index	Hedge Funds
Average	5.3%	4.0%	4.6%	5.0%	3.7%	3.9%	-2.6%	1.1%	3.7%
Std Dev	6.6%	5.0%	6.3%	11.4%	3.6%	2.8%	16.3%	16.2%	6.9%
Sharpe									
1y	1.95	1.70	3.57	2.48	2.47	2.54	0.35	0.33	1.22
3y	0.72	1.15	0.82	0.51	1.63	2.10	-0.36	-0.12	0.02
5y	0.41	0.69	0.48	0.42	0.98	1.24	-0.11	-0.22	0.36
10y	0.80	0.80	0.73	0.44	1.02	1.37	-0.16	0.07	0.53

Source: Morgan Stanley Research, Bloomberg

US asset returns: Jan-00 – Aug-10

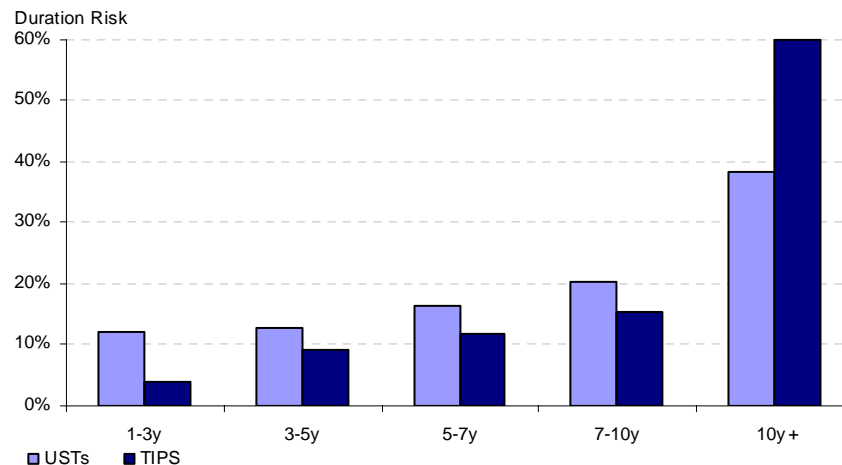


Source: Morgan Stanley Research, Bloomberg

# TIPS: Why the outperformance? Partly it is duration...

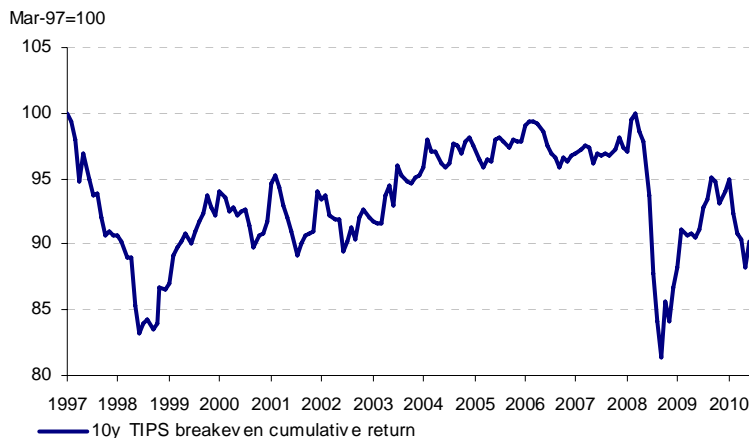
- Part of the reason for outperformance is that the TIPS universe has a longer average duration than other fixed income asset classes (e.g., 8.2y vs. 5.4y for USTs).
- More than half TIPS' indices duration risk is in the 10y+ portion of the curve.
- In a declining-yield environment, the additional duration has helped TIPS outperform. An equal DV01-hedged 10y TIPS position since 1997 would not have earned one money. Similarly, while cumulative returns on the Apr-28 TIPS have outpaced similar maturity USTs, a duration-hedged position would have delivered negative returns.
- Nonetheless, it is interesting to note the Sharpe ratio on TIPS has matched USTs since Jan-00.

UST vs. TIPS universe duration risk distribution



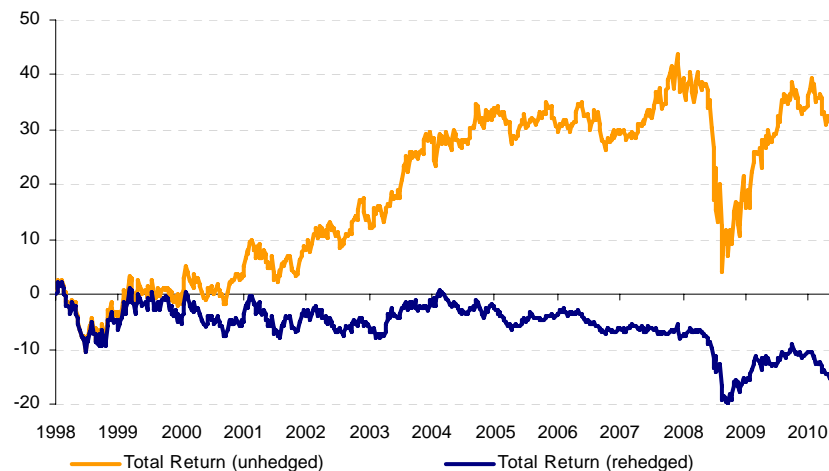
Source: Morgan Stanley Research, Bloomberg.

10y TIPS breakeven cumulative return



Source: Morgan Stanley Research, Bloomberg

Apr-28 TIPS cumulative return vs. Nov-27 UST

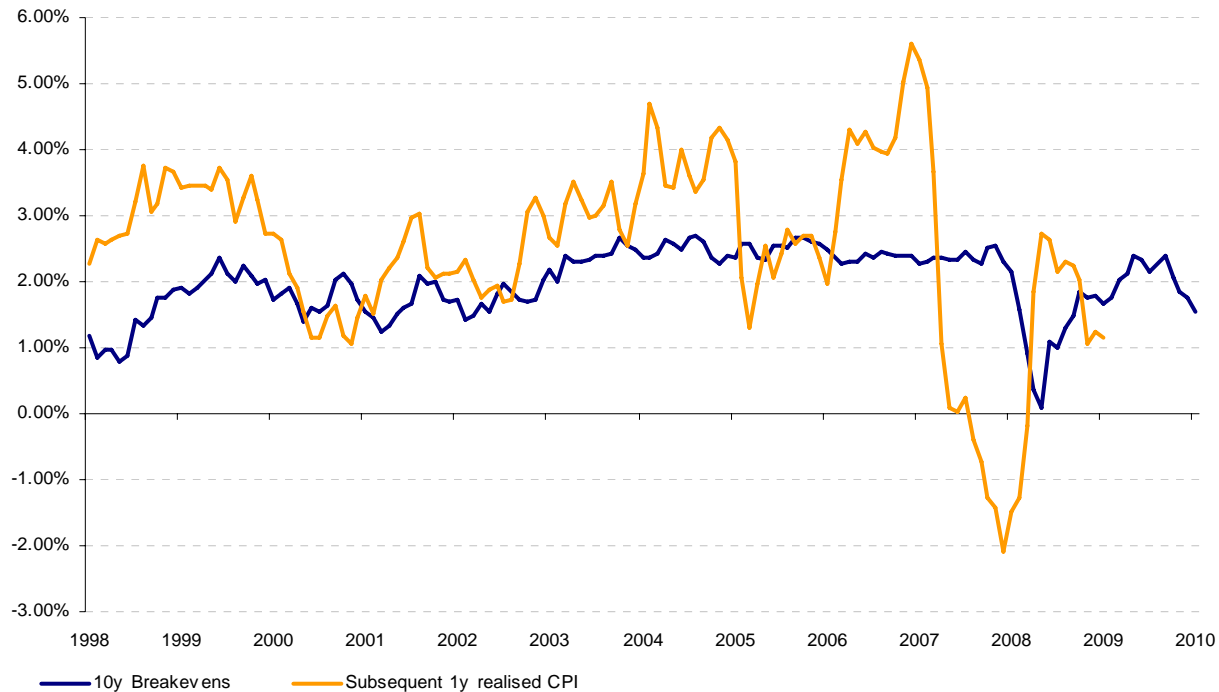


Source: Morgan Stanley Research, Bloomberg

# TIPS: Why the outperformance? ...but also positive carry

- TIPS breakevens have also traded tighter than subsequent 1-year realised CPI for most of the last 10 years.
- This has meant that being long TIPS breakevens has generally been a positive carry trade, and enabled TIPS to outperform in 2002-08 even though breakevens did not tighten meaningfully.

10y TIPS breakevens vs. realised CPI

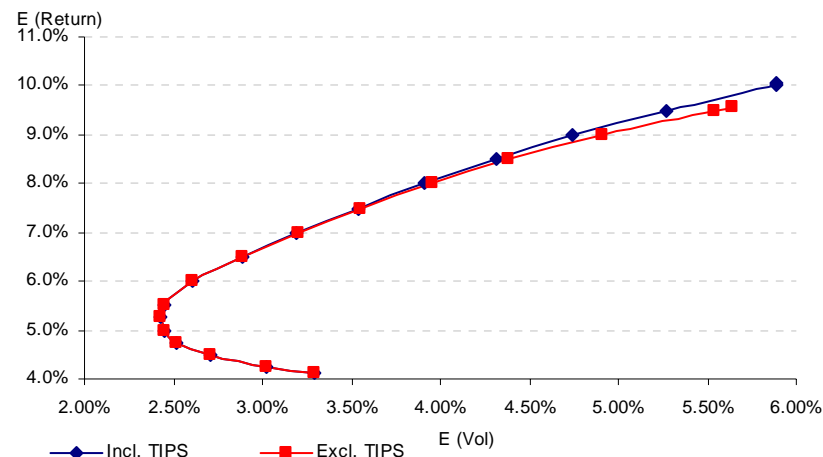


Source: Morgan Stanley Research, Bloomberg

# Portfolio-diversification benefits: historical data 2000-2007

- Historically it would have also made sense to hold TIPS from a portfolio-diversification perspective.
- We run a portfolio optimisation exercise for a multi-asset portfolio, assuming identical Sharpe ratios (0.4) for all assets and realised standard deviations and correlations for Jan-00 – Dec-07. Cash is capped at 10% of the portfolio and all other assets are capped at 25%.
- We find that including TIPS in the portfolio pushes out the efficient investment frontier. For the highest levels of expected return, one would want a maximum allocation to TIPS. We find similar results for a fixed income portfolio.

Efficient investment frontier, 2000-2007 data



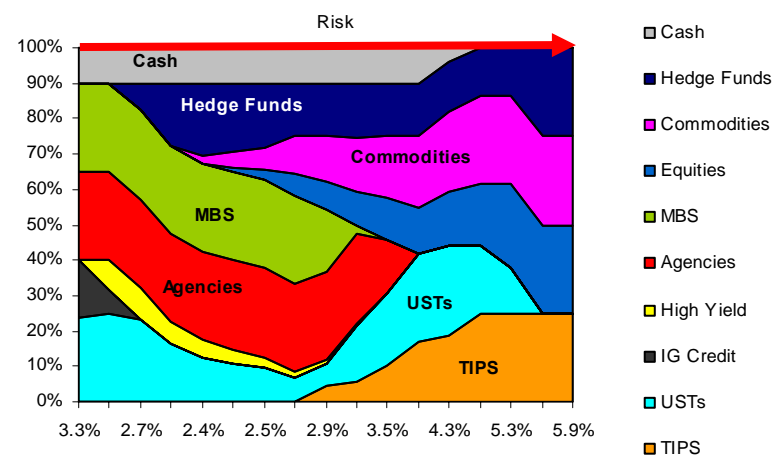
Source: Morgan Stanley Research, Bloomberg

Correlation Matrix

	TIPS	USTs	IG Credit	High Yield	Agencies	MBS	Equities	CRB	Hedge Funds	Cash
TIPS	1.00	0.86	0.78	-0.02	0.82	0.72	-0.24	0.11	-0.10	0.01
USTs		1.00	0.84	-0.09	0.97	0.86	-0.36	-0.07	-0.19	0.12
IG Credit			1.00	0.35	0.85	0.79	-0.07	-0.02	0.11	0.02
High Yield				1.00	-0.05	0.01	0.50	0.04	0.57	-0.16
Agencies					1.00	0.91	-0.33	-0.08	-0.15	0.15
MBS						1.00	-0.20	-0.10	-0.09	0.19
Equities							1.00	0.13	0.69	-0.07
CRB								1.00	0.28	-0.12
H Funds									1.00	-0.04
Cash										1.00

Source: Morgan Stanley Research

Portfolio composition for different levels of risk

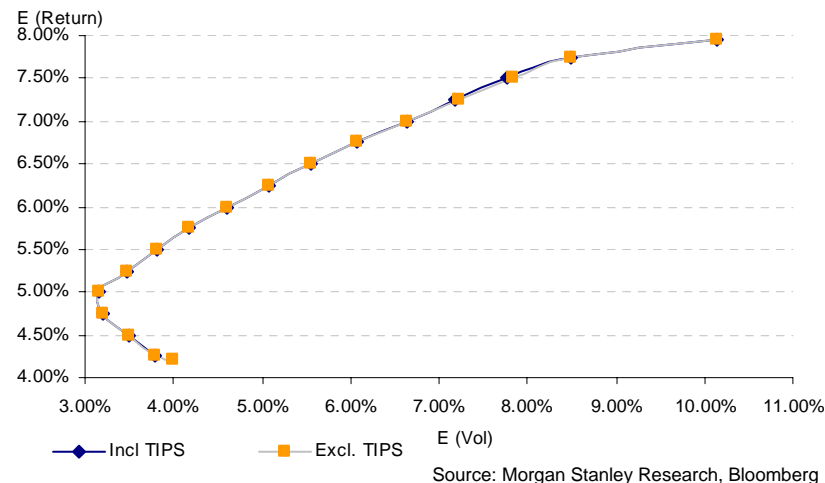


Source: Morgan Stanley Research

# Portfolio-diversification benefits: historical data 2000-2010

- However, when we update the analysis for the last two years, we find the argument for owning TIPS has declined significantly.
- We repeat the analysis but now use historical volatilities and correlations from 2000-2010. We find the proportion of the portfolio that would be allocated to TIPS drops significantly. The outward shift of the efficient frontier is also negligible.
- If we drop the constraints around maximum portfolio composition, there is no allocation to TIPS (nor Agencies, IG Credit and Hedge Funds).
- The reason for this is TIPS' increased correlation with risky assets:  
*Why own TIPS if they had the same risk-adjusted returns as USTs?*

Efficient investment frontier, 2000-2010 data

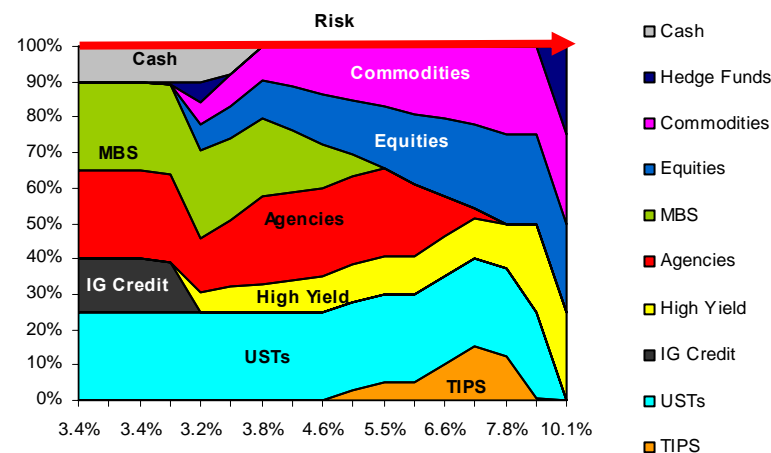


## Correlation Matrix

	TIPS	USTs	IG Credit	High Yield	Agencies	MBS	Equities	CRB	Hedge Funds	Cash
TIPS	1.00	0.68	0.69	0.27	0.69	0.63	0.05	0.32	0.15	0.02
USTs		1.00	0.55	-0.20	0.95	0.83	-0.28	-0.13	-0.24	0.08
IG Credit			1.00	0.55	0.66	0.61	0.24	0.24	0.36	-0.07
High Yield				1.00	-0.05	-0.01	0.63	0.38	0.68	-0.16
Agencies					1.00	0.89	-0.21	-0.08	-0.14	0.11
MBS						1.00	-0.12	-0.09	-0.10	0.08
Equities							1.00	0.36	0.75	-0.03
CRB								1.00	0.53	0.01
H Funds									1.00	0.02
Cash										1.00

Source: Morgan Stanley Research

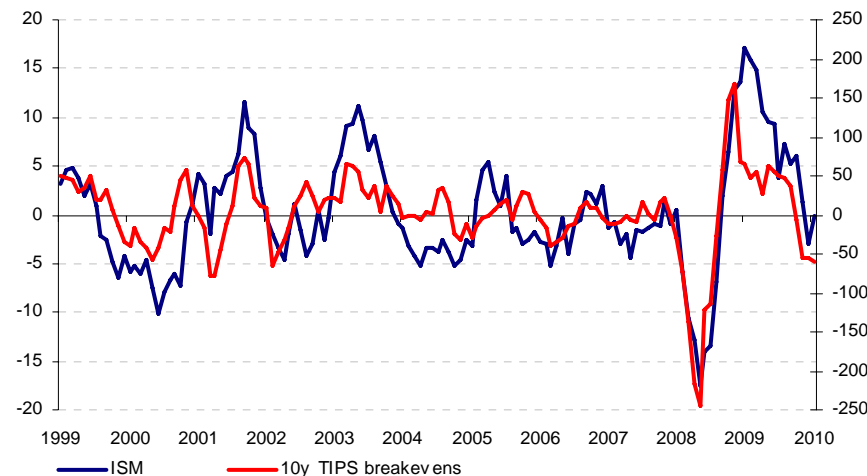
## Portfolio composition for different levels of risk



# Tactical timing: TIPS performance and the business cycle

- If the strategic diversification argument for holding TIPS no longer looks so compelling, then the ability to tactically time exposure to the asset class is more important.
- Fortunately, TIPS show a strong directional bias with the macro data:
  - We find returns are significantly better when the ISM is above 50 than below 50
  - We also find returns are better when realised CPI is above its 5y average
- These relationships make common sense, but are not obvious from an efficient markets perspective (i.e., this suggests a lag or inefficiency in pricing in changes in inflation risk).

6mth Δ ISM & 10y TIPS breakevens



Source: Morgan Stanley Research, Bloomberg

TIPS & UST directionality with ISM (Mar-97–Aug-10)

ISM above 50			
	TIPS	USTs	10y Breakeven
Ave	0.65%	0.51%	0.03%
Std Dev	1.45%	1.30%	1.23%
Sharpe	1.55	1.36	0.09
ISM below 50			
	TIPS	USTs	10y Breakeven
Ave	0.36%	0.56%	-0.27%
Std Dev	2.21%	1.55%	2.01%
Sharpe	0.57	1.25	-0.47

Source: Morgan Stanley Research, Bloomberg

TIPS & UST directionality with realised CPI (Mar-97–Aug-10)

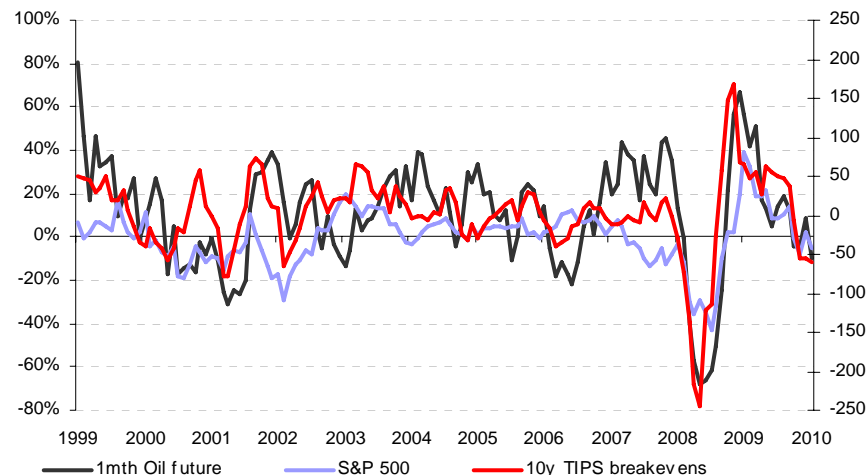
Yoy CPI above 5y average			
	TIPS	USTs	10y Breakeven
Ave	0.52%	0.54%	-0.05%
Std Dev	1.77%	1.11%	1.35%
Sharpe	1.01	1.67	-0.12
Yoy CPI below 5y average			
	TIPS	UST	10y Breakeven
Ave	0.60%	0.52%	-0.08%
Std Dev	1.70%	1.57%	1.64%
Sharpe	1.23	1.16	-0.17

Source: Morgan Stanley Research, Bloomberg

# Tactical timing: TIPS performance and other assets

- TIPS also trade with a strong directionality with other assets, e.g., equities and oil.
- We find TIPS outperform when equities and oil deliver positive returns.
- This result is not surprising (is consistent with previous asset return correlations). However, there does appear to be persistence in the relationship, which means other asset class returns can be used as trading signals for TIPS breakevens.

6mth Δ S&P 500, 1mth oil & 10y TIPS breakevens



Source: Morgan Stanley Research, Bloomberg

## TIPS & UST directionality with equities (Mar-97–Aug-10)

3mth S&P 500 returns positive			
	TIPS	USTs	10y Breakeven
Ave	0.41%	0.20%	0.27%
Std Dev	1.32%	1.23%	1.25%
Sharpe	1.07	0.56	0.75
3mth S&P 500 returns negative			
	TIPS	UST	10y Breakeven
Ave	0.79%	1.01%	-0.55%
Std Dev	2.17%	1.44%	1.74%
Sharpe	1.26	2.43	-1.10

Source: Morgan Stanley Research, Bloomberg

## TIPS & UST directionality with oil (Mar-97–Aug-10)

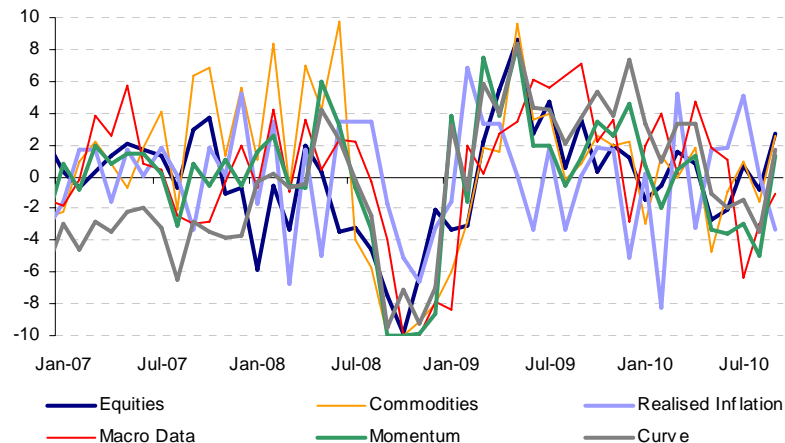
3mth Oil Δ positive			
	TIPS	USTs	10y Breakeven
Ave	0.71%	0.40%	0.28%
Std Dev	1.61%	1.33%	1.21%
Sharpe	1.54	1.05	0.79
3mth Oil Δ negative			
	TIPS	UST	10y Breakeven
Ave	0.34%	0.72%	-0.58%
Std Dev	1.88%	1.43%	1.77%
Sharpe	0.63	1.73	-1.13

Source: Morgan Stanley Research, Bloomberg

# Tactical timing: A simple quantitative model

- We use these relationships to build a simple model for tactically trading TIPS breakevens.
- We generate a “scorecard” for going long or short based on:
  - Equity returns
  - Commodity returns
  - Realised Inflation
  - Business cycle data (ISM)
  - Return momentum
  - Curve slope & central bank momentum
- The model is based on a simple average of the individual scores.
- Following it would have generated positive returns in 10 out of the last 14 years at an average Sharpe ratio of 0.75 (vs. long-only Sharpe -0.05) adjusting for transaction costs.
- Similar models also work for euro & UK breakevens.

TIPS tactical trading model: history of signal components



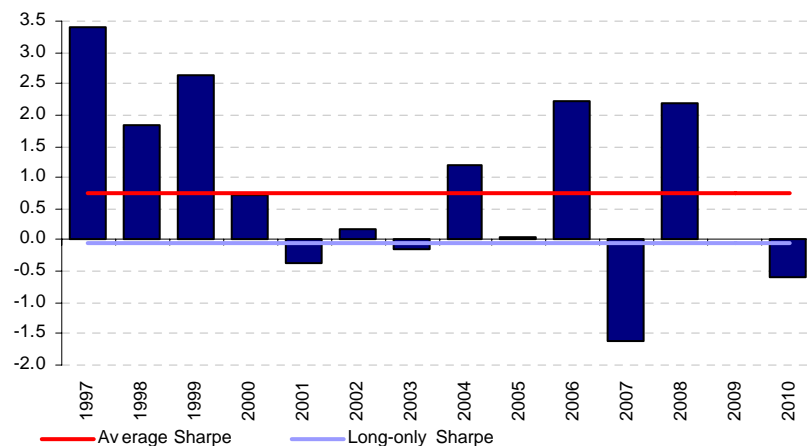
Source: Morgan Stanley Research.

TIPS Model: current signal

TIPS model	Latest	1mth ago	Δ
Equities	2.7	-0.8	3.5
Commodities	2.6	-1.6	4.2
Realised Inflation	-3.3	0.0	-3.3
Macro Data	-1.0	-3.0	1.9
Momentum	1.3	-5.0	6.3
Curve	1.7	-3.4	5.1
<b>Continuous Signal</b>	<b>0.8</b>	<b>-2.6</b>	<b>3.4</b>
<b>Threshold Signal</b>	<b>0.0</b>	<b>-3.3</b>	<b>3.3</b>

Source: Morgan Stanley Research.

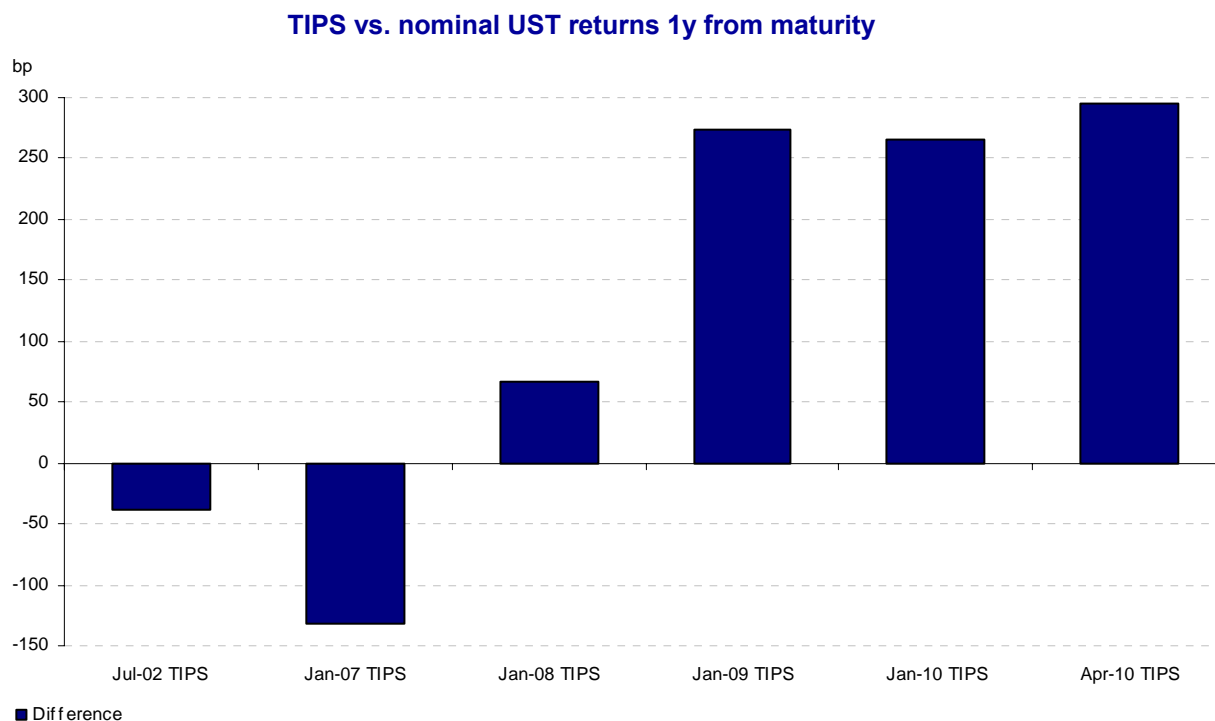
Historical performance: Sharpe ratios



Source: Morgan Stanley Research.

# Alpha opportunity due to market neglect? >1y TIPS

- Of the 6 TIPS that have matured to date, 4 have delivered higher returns than similar maturity nominal USTs in their last year to maturity.
- While it is difficult to say with a higher degree of confidence, due to the small sample size, we believe >1y TIPS are likely to deliver higher returns than similar maturity nominal USTs, as there are no natural buyers for the products.
- While money market funds may buy old T-Notes and Bonds, few of them want to hold short-dated inflation risk. There are no natural buyers of TIPS once they exit >1y TIPS indices



## Case Study I: Seeking Optimal Inflation Positioning via Derivatives

- **Client:** An open-end real return fund
- **Fund Objective:** Maximize real return by taking advantage of opportunities available in credit assets, inflation derivatives and interest rate derivatives to outperform TIPS portfolio. Credit allocation generally limited to 20%
- **Background:** Q1/Q2 2009, Fund PM's engaged MS to review overlay strategy to incorporate inflation and Rate derivatives
- **Circa Q1-Q2 2009: Analysis Result**
  - **Point 1:** Credit assets provided greater value than TIPS in early/mid 2009 and thus create opportunity for alpha generation
  - **Point 2:** The relationship between zero coupon inflation swaps and inflation breakevens was largely restored and TIPS were priced fairly vis-à-vis inflation derivatives
  - **Point 3:** Position for normalization of relationship between real rates and nominal rates.
- **Overlay Execution**
  - MS recommended that clients create a short duration credit portfolio and overlay it with inflation derivatives and interest rate derivatives. However, migration from TIPS portfolio should be opportunistic and gradual. Specifically, MS suggested the following sequencing:
    - Migration from longer dated TIPS to zero coupon inflation swaps
    - Cash from TIPS sales invested in corporate credit
    - (Overlay payor swaptions to position for increase in rates)

### Results: Significant Outperformance

	Normal Returns	Relative Performance
TIPS	7.3%	7.3%
Break-even	-5.5%	
Corporates	21.2%	15.7%
Performance Improvement		8.4%

*Duration Matched Annualized Returns*

## Case Study I Analysis Framework: Evaluating Investment Alternatives

### Investment Criteria

Asset	Investment Measure	Consideration
TIPs	L+ Spread	Is the spread pickup attractive on a risk adjusted basis?
Credit	L+ Spread	

### Inflation Criteria

Asset	Inflation Measure	Consideration
TIPs	TIPS Breakevens	In the higher inflation scenario, which strategy provides the better return?
<b>OTC Derivatives</b>		
ZC Swap	ZC Swap Breakevens	
CMS Caps	Return potential based on scenario analysis	

### Key Questions

- How attractive are TIPS or credit alternatives compared to historical valuation and in the current context?
- What is the impact of higher inflation on nominal rates and consequently on duration sensitive assets?

## Case Study II: Seeking Improved Carry and Return

---

- **Client:** Long Duration Account
- **Fund Objective:** Maximize total return to meet duration requirements for pension
- **Background:** Q1/Q2 2009, Fund PM's engaged MS to review overlay strategy to incorporate inflation and OTC derivatives
- **Circa Q1-Q2 2009: Analysis Result**
  - **Key Point:** On an asset swap basis TIPS were trading at a significant disconnect to default risk. Converting TIPS into a fixed rate instrument provided an incremental yield pick-up of 150 to 200 bps
- **Overlay Execution**
  - MS recommended that client create a “synthetic nominal UST” by swapping TIPS into a fixed rate asset

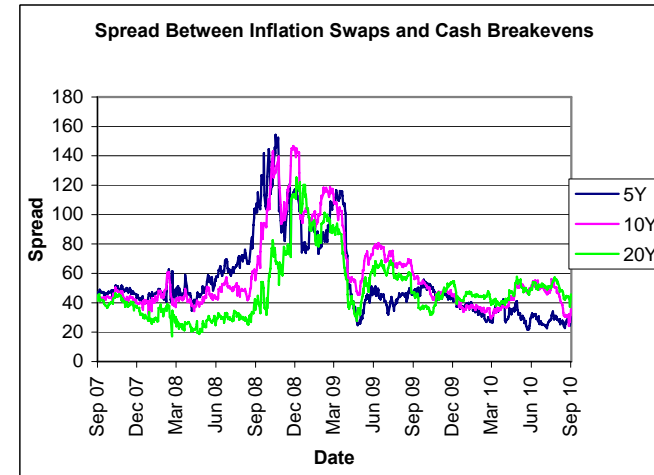
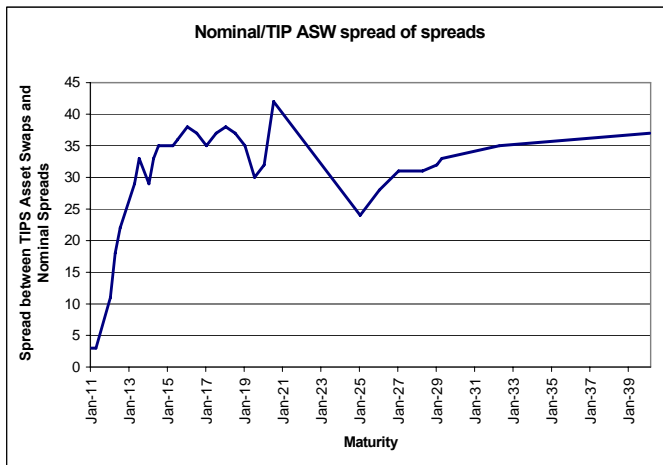
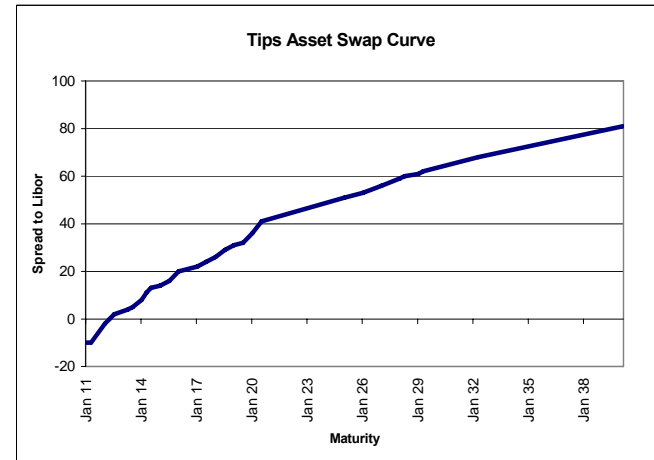
**Results: Strategy Added on Average 150 bp of incremental yield**

Trade Date	TII	Asset Swap		Duration		
		Spread	Swap rate	P/L	Spread P/L	Total P/L
4/15/2009	TII 4/15/2032	150	3.29	0.4	15	15.4
7/31/2009	TII 4/15/2029	85	4.089	13.01	4	17.01

## Cash versus Swap

### Key Drivers of TIPS ASW

- Supply/Demand dynamics of Cash/Swaps (Floor, Flow related market dislocations)
- Liquidity
- Nominal Spreads
- Balance Sheet/ Repo
- Cash flow Imbalance – Credit curve/ Funding



Source: Morgan Stanley Research

## Disclosure Section

---

The information and opinions in Morgan Stanley Research were prepared or are disseminated by Morgan Stanley & Co. Incorporated and/or Morgan Stanley C.T.V.M. S.A. and/or Morgan Stanley & Co. International plc and/or RMB Morgan Stanley (Proprietary) Limited and/or Morgan Stanley MUFG Securities, Co., Ltd. and/or Morgan Stanley Asia Limited and/or Morgan Stanley Asia (Singapore) Pte. (Registration number 199206298Z) and/or Morgan Stanley Asia (Singapore) Securities Pte Ltd (Registration number 200008434H) and/or Morgan Stanley Taiwan Limited and/or Morgan Stanley & Co International plc, Seoul Branch, and/or Morgan Stanley Australia Limited (A.B.N. 67 003 734 576, holder of Australian financial services license No. 233742, which accepts responsibility for its contents), and/or Morgan Stanley Smith Barney Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813, which accepts responsibility for its contents), and/or Morgan Stanley India Company Private Limited and their affiliates (collectively, "Morgan Stanley").

For important disclosures, stock price charts and equity rating histories regarding companies that are the subject of this report, please see the Morgan Stanley Research Disclosure Website at [www.morganstanley.com/researchdisclosures](http://www.morganstanley.com/researchdisclosures), or contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY, 10036 USA.

### **Analyst Certification**

The following analysts hereby certify that their views about the companies and their securities discussed in this report are accurately expressed and that they have not received and will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this report: Anton Heese

Unless otherwise stated, the individuals listed on the cover page of this report are research analysts.

### **Global Research Conflict Management Policy**

Morgan Stanley Research has been published in accordance with our conflict management policy, which is available at [www.morganstanley.com/institutional/research/conflictolicies](http://www.morganstanley.com/institutional/research/conflictolicies).

### **Important US Regulatory Disclosures on Subject Companies**

The equity research analysts or strategists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality of research, investor client feedback, stock picking, competitive factors, firm revenues and overall investment banking revenues.

Morgan Stanley and its affiliates do business that relates to companies/instruments covered in Morgan Stanley Research, including market making, providing liquidity and specialized trading, risk arbitrage and other proprietary trading, fund management, commercial banking, extension of credit, investment services and investment banking. Morgan Stanley sells to and buys from customers the securities/instruments of companies covered in Morgan Stanley Research on a principal basis. Morgan Stanley may have a position in the debt of the Company or instruments discussed in this report.

Certain disclosures listed above are also for compliance with applicable regulations in non-US jurisdictions.

### **STOCK RATINGS**

Morgan Stanley uses a relative rating system using terms such as Overweight, Equal-weight, Not-Rated or Underweight (see definitions below). Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold and sell. Investors should carefully read the definitions of all ratings used in Morgan Stanley Research. In addition, since Morgan Stanley Research contains more complete information concerning the analyst's views, investors should carefully read Morgan Stanley Research, in its entirety, and not infer the contents from the rating alone. In any case, ratings (or research) should not be used or relied upon as investment advice. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations.

### **Global Stock Ratings Distribution (as of August 31, 2010)**

For disclosure purposes only (in accordance with NASD and NYSE requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

## Disclosure Section (Cont.)

Stock Rating Category	Coverage Universe		Investment Banking Clients (IBC)		
	Count	% of Total	Count	% of Total IBC	% of Rating Category
Overweight/Buy	1082	42%	381	43%	35%
Equal-weight/Hold	1145	44%	402	46%	35%
Not-Rated/Hold	13	0%	4	0%	31%
Underweight/Sell	364	14%	91	10%	25%
Total	2,604		878		

Data include common stock and ADRs currently assigned ratings. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months.

### Analyst Stock Ratings

**Overweight (O).** The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

**Equal-weight (E).** The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

**Not-Rated (NR).** Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

**Underweight (U).** The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

### Analyst Industry Views

**Attractive (A):** The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.

**In-Line (I):** The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.

**Cautious (C):** The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index.

### Important Disclosures for Morgan Stanley Smith Barney LLC Customers

Citi Investment Research & Analysis (CIRA) research reports may be available about the companies or topics that are the subject of Morgan Stanley Research. Ask your Financial Advisor or use Research Center to view any available CIRA research reports in addition to Morgan Stanley research reports.

Important disclosures regarding the relationship between the companies that are the subject of Morgan Stanley Research and Morgan Stanley Smith Barney LLC, Morgan Stanley and Citigroup Global Markets Inc. or any of their affiliates, are available on the Morgan Stanley Smith Barney disclosure website at [www.morganstanleysmithbarney.com/researchdisclosures](http://www.morganstanleysmithbarney.com/researchdisclosures).

For Morgan Stanley and Citigroup Global Markets, Inc. specific disclosures, you may refer to [www.morganstanley.com/researchdisclosures](http://www.morganstanley.com/researchdisclosures) and [https://www.citigroupgeo.com/geopublic/Disclosures/index\\_a.html](https://www.citigroupgeo.com/geopublic/Disclosures/index_a.html).

## Disclosure Section (Cont.)

---

Each Morgan Stanley Equity Research report is reviewed and approved on behalf of Morgan Stanley Smith Barney LLC. This review and approval is conducted by the same person who reviews the Equity Research report on behalf of Morgan Stanley. This could create a conflict of interest.

### Other Important Disclosures

Morgan Stanley produces an equity research product called a "Tactical Idea." Views contained in a "Tactical Idea" on a particular stock may be contrary to the recommendations or views expressed in research on the same stock. This may be the result of differing time horizons, methodologies, market events, or other factors. For all research available on a particular stock, please contact your sales representative or go to Client Link at [www.morganstanley.com](http://www.morganstanley.com).

Morgan Stanley Research does not provide individually tailored investment advice. Morgan Stanley Research has been prepared without regard to the individual financial circumstances and objectives of persons who receive it. Morgan Stanley recommends that investors independently evaluate particular investments and strategies, and encourages investors to seek the advice of a financial adviser. The appropriateness of a particular investment or strategy will depend on an investor's individual circumstances and objectives. The securities, instruments, or strategies discussed in Morgan Stanley Research may not be suitable for all investors, and certain investors may not be eligible to purchase or participate in some or all of them.

The fixed income research analysts or strategists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality, accuracy and value of research, firm profitability or revenues (which include fixed income trading and capital markets profitability or revenues), client feedback and competitive factors. Fixed Income Research analysts' or strategists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

Morgan Stanley Research is not an offer to buy or sell or the solicitation of an offer to buy or sell any security/instrument or to participate in any particular trading strategy. The "Important US Regulatory Disclosures on Subject Companies" section in Morgan Stanley Research lists all companies mentioned where Morgan Stanley owns 1% or more of a class of common equity securities of the companies. For all other companies mentioned in Morgan Stanley Research, Morgan Stanley may have an investment of less than 1% in securities/instruments or derivatives of securities/instruments of companies and may trade them in ways different from those discussed in Morgan Stanley Research. Employees of Morgan Stanley not involved in the preparation of Morgan Stanley Research may have investments in securities/instruments or derivatives of securities/instruments of companies mentioned and may trade them in ways different from those discussed in Morgan Stanley Research. Derivatives may be issued by Morgan Stanley or associated persons.

With the exception of information regarding Morgan Stanley, Morgan Stanley Research is based on public information. Morgan Stanley makes every effort to use reliable, comprehensive information, but we make no representation that it is accurate or complete. We have no obligation to tell you when opinions or information in Morgan Stanley Research change apart from when we intend to discontinue equity research coverage of a subject company. Facts and views presented in Morgan Stanley Research have not been reviewed by, and may not reflect information known to, professionals in other Morgan Stanley business areas, including investment banking personnel.

Morgan Stanley Research personnel may participate in company events such as site visits and are generally prohibited from accepting payment by the company of associated expenses unless pre-approved by authorized members of Research management.

The value of and income from your investments may vary because of changes in interest rates, foreign exchange rates, default rates, prepayment rates, securities/instruments prices, market indexes, operational or financial conditions of companies or other factors. There may be time limitations on the exercise of options or other rights in securities/instruments transactions. Past performance is not necessarily a guide to future performance. Estimates of future performance are based on assumptions that may not be realized. If provided, and unless otherwise stated, the closing price on the cover page is that of the primary exchange for the subject company's securities/instruments.

Morgan Stanley may make investment decisions or take proprietary positions that are inconsistent with the recommendations or views in this report.

To our readers in Taiwan: Information on securities/instruments that trade in Taiwan is distributed by Morgan Stanley Taiwan Limited ("MSTL"). Such information is for your reference only. Information on any securities/instruments issued by a company owned by the government of or incorporated in the PRC and listed in on the Stock Exchange of Hong Kong ("SEHK"), namely the H-shares, including the component company stocks of the Stock Exchange of Hong Kong ("SEHK")'s Hang Seng China Enterprise Index; or any securities/instruments issued by a company that is 30% or more directly- or indirectly-owned by the government of or a company incorporated in the PRC and traded on an exchange in Hong Kong or Macau, namely SEHK's Red Chip shares, including the component company of the SEHK's China-affiliated Corp Index is distributed only to Taiwan Securities Investment Trust Enterprises ("SITE"). The reader should independently evaluate the investment risks and is solely responsible for their investment decisions. Morgan Stanley Research may not be distributed to the public media or quoted or used by the public media without the express written consent of Morgan Stanley. Information on securities/instruments that do not trade in Taiwan is for informational purposes only and is not to be construed as a recommendation or a solicitation to trade in such securities/instruments. MSTL may not execute transactions for clients in these securities/instruments.

## Disclosure Section (Cont.)

---

To our readers in Hong Kong: Information is distributed in Hong Kong by and on behalf of, and is attributable to, Morgan Stanley Asia Limited as part of its regulated activities in Hong Kong. If you have any queries concerning Morgan Stanley Research, please contact our Hong Kong sales representatives.

Morgan Stanley Research is disseminated in Japan by Morgan Stanley MUFG Securities, Co., Ltd.; in Hong Kong by Morgan Stanley Asia Limited (which accepts responsibility for its contents); in Singapore by Morgan Stanley Asia (Singapore) Pte. (Registration number 199206298Z) and/or Morgan Stanley Asia (Singapore) Securities Pte Ltd (Registration number 200008434H), regulated by the Monetary Authority of Singapore, which accepts responsibility for its contents; in Australia to "wholesale clients" within the meaning of the Australian Corporations Act by Morgan Stanley Australia Limited A.B.N. 67 003 734 576, holder of Australian financial services license No. 233742, which accepts responsibility for its contents; in Australia to "wholesale clients" and "retail clients" within the meaning of the Australian Corporations Act by Morgan Stanley Smith Barney Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813, which accepts responsibility for its contents; in Korea by Morgan Stanley & Co International plc, Seoul Branch; in India by Morgan Stanley India Company Private Limited; in Canada by Morgan Stanley Canada Limited, which has approved of, and has agreed to take responsibility for, the contents of Morgan Stanley Research in Canada; in Germany by Morgan Stanley Bank AG, Frankfurt am Main and Morgan Stanley Private Wealth Management Limited, Niederlassung Deutschland, regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin); in Spain by Morgan Stanley, S.V., S.A., a Morgan Stanley group company, which is supervised by the Spanish Securities Markets Commission (CNMV) and states that Morgan Stanley Research has been written and distributed in accordance with the rules of conduct applicable to financial research as established under Spanish regulations; in the United States by Morgan Stanley & Co. Incorporated, which accepts responsibility for its contents. Morgan Stanley & Co. International plc, authorized and regulated by the Financial Services Authority, disseminates in the UK research that it has prepared, and approves solely for the purposes of section 21 of the Financial Services and Markets Act 2000, research which has been prepared by any of its affiliates. Morgan Stanley Private Wealth Management Limited, authorized and regulated by the Financial Services Authority, also disseminates Morgan Stanley Research in the UK. Private U.K. investors should obtain the advice of their Morgan Stanley & Co. International plc or Morgan Stanley Private Wealth Management representative about the investments concerned. RMB Morgan Stanley (Proprietary) Limited is a member of the JSE Limited and regulated by the Financial Services Board in South Africa. RMB Morgan Stanley (Proprietary) Limited is a joint venture owned equally by Morgan Stanley International Holdings Inc. and RMB Investment Advisory (Proprietary) Limited, which is wholly owned by FirstRand Limited.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (DIFC Branch), regulated by the Dubai Financial Services Authority (the DFSA), and is directed at Professional Clients only, as defined by the DFSA. The financial products or financial services to which this research relates will only be made available to a customer who we are satisfied meets the regulatory criteria to be a Professional Client.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (QFC Branch), regulated by the Qatar Financial Centre Regulatory Authority (the QFCRA), and is directed at business customers and market counterparties only and is not intended for Retail Customers as defined by the QFCRA.

As required by the Capital Markets Board of Turkey, investment information, comments and recommendations stated here, are not within the scope of investment advisory activity. Investment advisory service is provided in accordance with a contract of engagement on investment advisory concluded between brokerage houses, portfolio management companies, non-deposit banks and clients. Comments and recommendations stated here rely on the individual opinions of the ones providing these comments and recommendations. These opinions may not fit to your financial status, risk and return preferences. For this reason, to make an investment decision by relying solely to this information stated here may not bring about outcomes that fit your expectations.

The trademarks and service marks contained in Morgan Stanley Research are the property of their respective owners. Third-party data providers make no warranties or representations of any kind relating to the accuracy, completeness, or timeliness of the data they provide and shall not have liability for any damages of any kind relating to such data. The Global Industry Classification Standard ("GICS") was developed by and is the exclusive property of MSCI and S&P.

Morgan Stanley Research, or any portion thereof may not be reprinted, sold or redistributed without the written consent of Morgan Stanley.

Morgan Stanley Research is disseminated and available primarily electronically, and, in some cases, in printed form.

**Additional information on recommended securities/instruments is available on request.**

09-29-10 sm

**The Americas**

1585 Broadway  
New York, NY 10036-8293  
United States  
Tel: +1 (1)212 761 4000

**Europe**

20 Bank Street, Canary Wharf  
London E14 4AD  
United Kingdom  
Tel: +44 (0)20 7425 8000

**Japan**

4-20-3, Ebisu Shibuya-ku  
Tokyo 150-6008  
Japan  
Tel: +81 (0)3 5424 5000

**Asia/Pacific**

International Commerce Center  
1 Austin Road West  
Kowloon, Hong Kong  
Tel: +852 2848 5200