

UBS Comm-PASS

Commodities Portfolio Algorithmic Strategy System



February 2010

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SECTION 1

Executive Summary

UBS Commodities Portfolio Algorithmic Trading Strategy System ("UBS Comm-PASS")

UBS Comm-PASS is an algorithmic trading strategy that aims to exploit distinctive commodity futures price behaviour

Product Description

- ◆ The UBS Comm-PASS index tracks the performance of a portfolio consisting of a basket of 19 commodity futures positions, either long or short.
- ◆ Long or short positions in each commodity are determined by individual buy and sell signals according to rules based on exponential moving averages that take into account distinctive price behaviour of each of the 19 underlying commodity futures.
- ◆ The portfolio covers five different commodity sectors: Energy, Precious Metals, Base Metals, Agriculture, and Livestock

Historic Performance

- ◆ UBS Comm-PASS yielded an excess return of 20.37%¹ with a volatility of 16.49%¹ in the period of Oct 1997 until Dec 2009, whereas S&P GSCI has provided an excess return of -1.24%¹ with a volatility of 25.25%¹ during the same period.

Portfolio diversification benefits

- ◆ Low correlation to passive commodity indices and equities: Transparency and Liquidity
- ◆ Weights are chosen to maintain a diversified portfolio and are based on liquidity issues and the performance of each strategy. These weights are reviewed and revised as needed annually.
- ◆ All strategy principles and underlying positions are disclosed to investors. Index is calculated and posted on Bloomberg and/or Reuters daily by the Structured Products Research team

Flexible investment formats

- ◆ Clients can access UBS Comm-PASS via a wide range of structures and wrappers:
 - Structures: Index tracker, levered participation, options, principal protected note
 - Wrappers: UBS issued Notes or certificates, third-party EMTNS, excess return swaps, warrants or funds

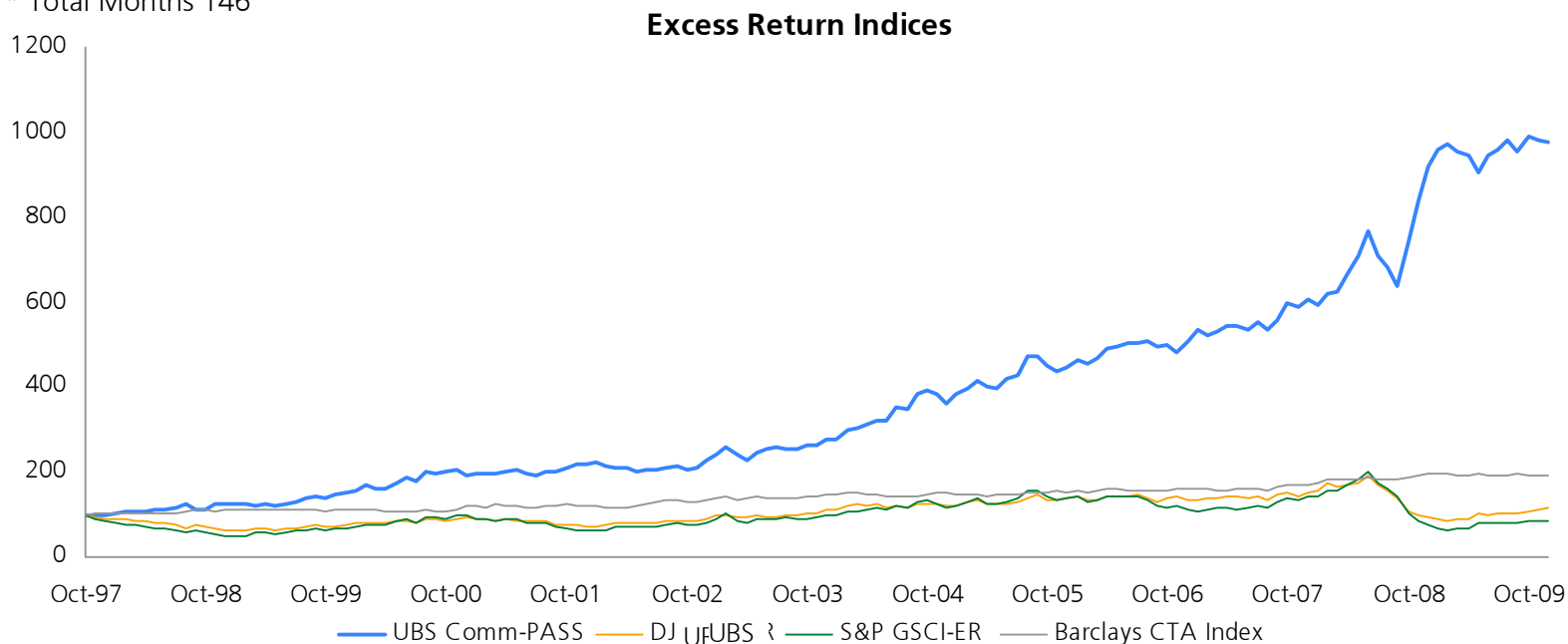
Note:

1. The commodities index used is the S&P GSCI Excess Return Index (SPGSCIP Index) and equity index used is MSCI World (MXWO Index). Analysis is based on daily data from 2 October 1997 to 29 December 2009. Data contains backtested values from October 1997 to March 2007 for UCCP1A Index and live performance thereafter.

UBS Comm-PASS Performance, Oct 1997- December 2009⁽¹⁾

Excess Return Figures	UBS Comm-PASS	DJ UBS - ER	S&P GSCI-ER	Barclays CTA Index ⁽³⁾
Annualised Excess Returns⁽²⁾	20.60%	1.11%	-1.33%	5.57%
Volatility of Excess Returns	15.46%	17.25%	24.91%	7.24%
Sharpe Ratio	1.33	0.06	-0.05	0.77
Calmar Ratio	1.21	0.02	-0.02	0.72
Maximum Drawdown	17.0%	54.5%	67.8%	7.7%
Months in Drawdown	10	71	63	19

* Total Months 146



Source: Bloomberg, UBS AG

Notes:

- Figures in table based on month end data from October 31st, 1997 to October 31st, 2009.
- UBS Comm-PASS Excess Return incorporates index access cost of 8bp per month plus transaction costs. Return figures of Barclay CTA, S&P GSCI, DJ-UBS indices do not take into account any potential access/replication costs. Data contains backtested values from October 1997 to March 2007 for UCCP1A Index and live performance thereafter.
- Barclay CTA Index is representative of the performance of commodity trading advisors. It is a part of the Barclay family of hedge fund indices.

SECTION 2

UBS Comm-PASS – Description and Rationale

UBS Comm-PASS: Introduction

UBS Comm-PASS is a commodity strategy which takes diversified long and short positions in commodity futures based on algorithmic trading signals

Product Description

- ◆ The UBS Comm-PASS portfolio consists of a basket of 19 commodity futures positions, either long or short.
- ◆ The UBS Comm-PASS Index tracks the performance of this portfolio.
- ◆ Long or short positions in each commodity are determined by individual buy and sell signals according to rules based on exponential moving averages that take into account distinctive price behaviour of each of the 19 underlying commodity futures.
- ◆ The portfolio covers five different commodity sectors: Energy, Precious Metals, Base Metals, Agriculture, and Livestock.

Weighting, Rolling, and Rebalancing

- ◆ Weights are chosen to maintain a diversified portfolio.
- ◆ The weighting criteria takes into account liquidity issues and the performance of each strategy.
- ◆ The portfolio's commodities are rebalanced to the target weights monthly. These weights are reviewed and revised as needed annually.
- ◆ The futures are generally rolled from the front contract into the following contract, starting on the last business days in the calendar month prior to expiry, for three business days.

Sector	Commodity	Weight
Energy	WTI Crude Oil	22.9%
	Brent Crude Oil	12.5%
	Gasoil	4.5%
	Heating oil	4.3%
	HHUB Natural Gas	4.0%
	RBOB Gasoline	2.8%
	<i>Sub Total</i>	<i>51.0%</i>
Agriculture	Corn	5.1%
	Soybean	5.0%
	Wheat	3.6%
	Sugar#11	3.5%
	Coffee	2.6%
	<i>Sub Total</i>	<i>19.8%</i>
Base Metals	Copper	7.00%
	Aluminum	6.60%
	Zinc	2.40%
	Nickel	1.70%
	Lead	1.10%
	<i>Sub Total</i>	<i>18.80%</i>
Precious Metals	Gold	4.7%
	Silver	1.4%
	<i>Sub Total</i>	<i>6.1%</i>
Livestock	Live Cattle	4.3%
	<i>Sub Total</i>	<i>4.3%</i>
	<i>Total</i>	<i>100.0%</i>

Notes:

1. Weights are subject to annual revision to account for liquidity, performance and any changes to trending behaviour of commodity futures.
2. Weights revised as of September 2008.

UBS Comm-PASS: Source of Returns

Comm-PASS strategy exploits the unique behaviour of commodities prices

Commodity market characteristics (see Appendix 1 for further discussion)

- ◆ Some commodities trend while others counter-trend.
- ◆ Commodities have asymmetric returns: Fast upward movements versus slow downward movements, for instance (gasoline).
- ◆ High volatility.

UBS Comm-PASS takes advantage of these characteristics:

- ◆ The UBS Comm-PASS algorithm uses Exponential Moving Average (EMA) indicators designed to extract value from these characteristics.
- ◆ Algorithm parameters for each commodity are chosen independently, leading to a higher individual performance, a lower correlation between the returns of individual underlyings, and a higher Sharpe ratio for the overall portfolio.
- ◆ Applies a strategy that can be long or short, potentially generating positive returns in both bull and bear markets.
- ◆ Generally, high commodity price volatility drives positive UBS Comm-PASS returns.

Other features designed to avoid the pitfalls of passive or other active commodity trading strategies:

- ◆ An algorithmic investment approach ensures transparency and avoids the style drift of active managers.
- ◆ Positions are adjusted based on signals generated from current market conditions in order to constantly capture new market opportunities.
- ◆ Monthly rebalancing of commodity exposure maintains portfolio diversification and generates rebalancing returns (Erb and Harvey, 2006).

Trending and Counter-Trending Behaviour

Fast moving average refers to the moving average with shorter window length

Slow moving average refers to the moving average with longer window length

Trending

Follow the current direction of the market
because it is expected to continue

Counter-trending

Do NOT follow the current direction of the market
because it is expected to change

**Fast MA
>
Slow MA**

- Price is trending up, and it is expected to continue

Buy

- Price is trending up, but it is expected to reverse

Sell

**Fast MA
<
Slow MA**

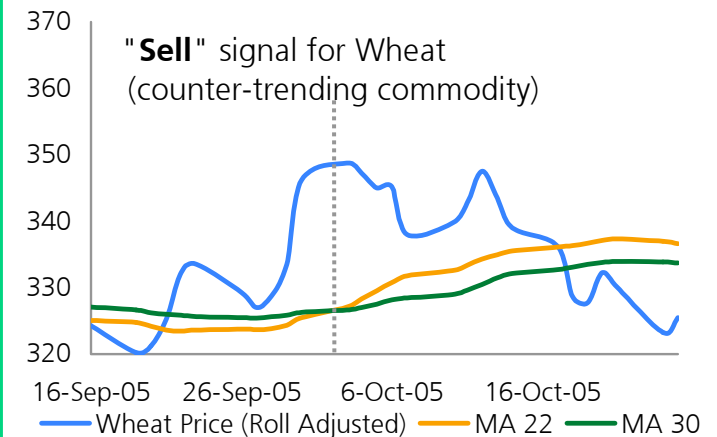
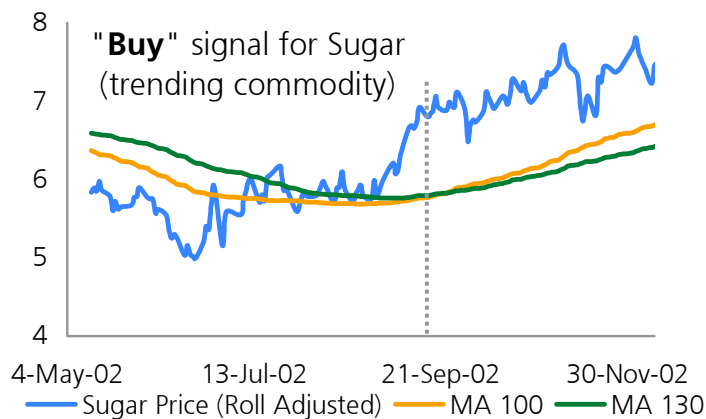
- Price is trending down, and it is expected to continue

Sell

- Price is trending down, but it is expected to reverse

Buy

Examples



Source: Bloomberg, UBS AG

Trending and Counter-Trending Behaviour

- ◆ UBS Comm-PASS uses a combination of Exponential Moving Average (EMA)¹ indicators to capture trending (or counter-trending) behaviour in commodities.
- ◆ For each commodity, the strategy model consists of two pairs of EMAs. The first EMA pair is used to generate *buy signals*, whilst the second EMA pair is used to generate *sell signals*.
- ◆ Using two pairs of EMAs allows UBS Comm-PASS to capture the asymmetric price behaviour seen in commodities markets in a manner a single pair would fail to achieve.

Example For Gasoil (Trend)

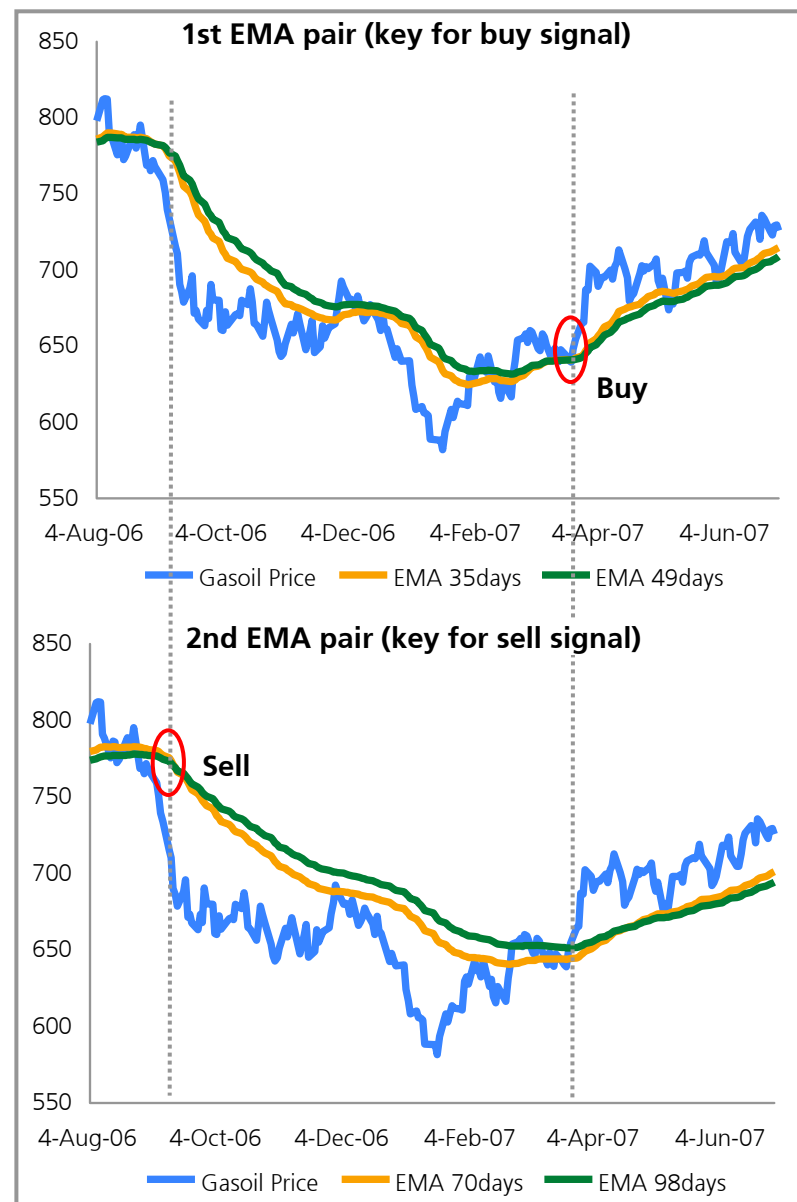
1st EMA pair (key for buy signal) → EMA35 days vs. EMA49 days

2nd EMA pair (key for sell signal) → EMA70 days vs. EMA98 days

Illustration of a rule:

When EMA35 days > EMA49 days, strategy goes long gasoil

When EMA70 days < EMA98 days, strategy goes short gasoil



Note:

1. See explanations on EMA in Appendix.

Results and Benefits

A strategy that reacts systematically to commodity market price trends

Strong historic performance in both bull and bear markets

- ◆ Annual strategy returns of 21.60% p.a. (since October 1997)¹.
- ◆ Consistent performance in both the 1997–1999 bear market and the bull market that we have witnessed since 2003. Performance maintained through 2004–2008, including periods where conventional commodity indices have suffered from the contango and associated negative roll returns.

Higher performance ratios

- ◆ UBS Comm-PASS has significantly higher Sharpe² and Calmar³ ratios compared to both conventional commodity indices and also to the Barclay CTA index⁴.

Portfolio diversification benefits

- ◆ Low correlation to conventional asset classes such as fixed income (+1.56%)⁵ and equities (-10.84%)⁵.

Low sensitivity to negative roll yield

- ◆ Can be long or short such that over time and across the portfolio, UBS Comm-PASS is largely neutral to the term structure of the futures curves.

Data Source: Bloomberg

Notes:

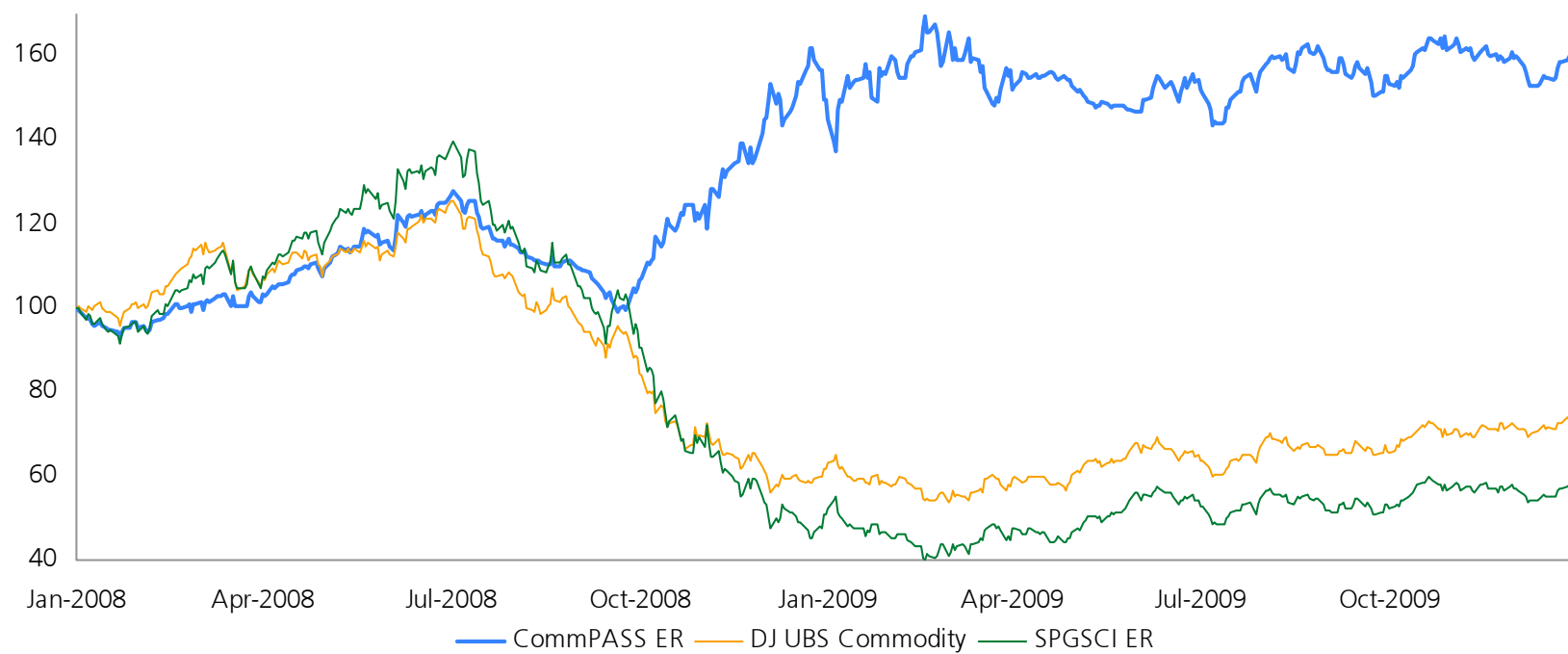
1. Backtested data from October 1997 to January 2008, live thereafter until 29 December 2009.
2. Sharpe is a risk-adjusted return measurement; calculated as annualized excess return divided by annualized volatility.
3. Calmar is a risk-adjusted return measurement; calculated as annualized excess return divided by maximum drawdown. Maximum drawdown is the percentage fall from a high-water mark to a later low-water mark.
4. Barclay CTA Index (BARCCTA Index) is representative of the performance of commodity trading advisors. It is a part of the Barclay family of hedge fund indices.
5. Correlation calculation uses daily data for fixed income index Citigroup Global Govt Bond Index (SBBIG Index) and equity index MSCI World (MXWO Index).

SECTION 3

Performance Discussion

Comparative Performance (1) – Jan 2008 To Date

UBS Comm-PASS has clearly outperformed the long-only S&P GSCI and DJ-UBS Indices



Source: Bloomberg, GSCI ticker is SPGSCIP, Dow Jones UBS ticker is DJUBS

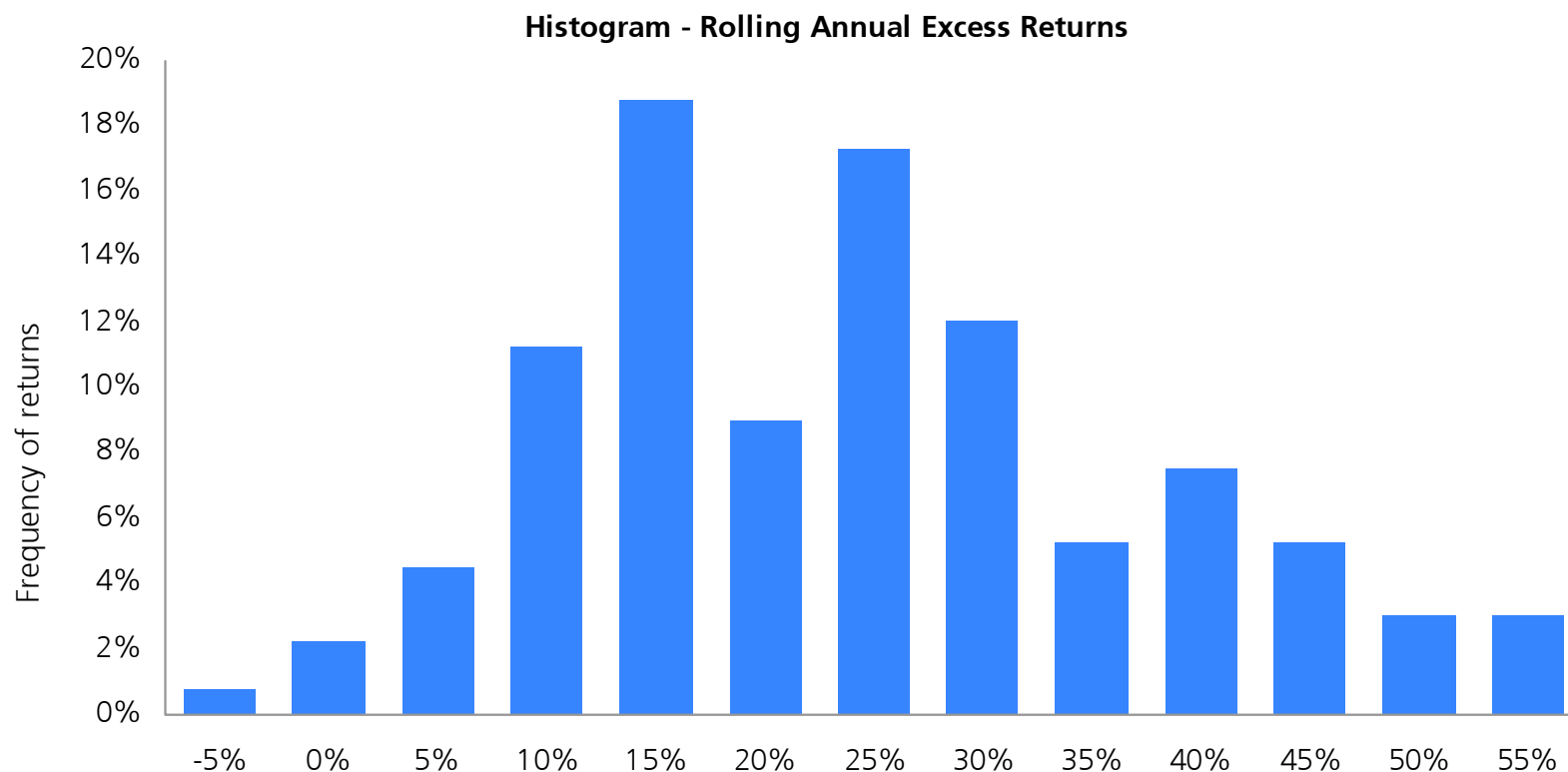
- ◆ Since the start of 2008, UBS Comm-PASS has yielded an annualised return of 26.26% with an annualized volatility of 22.32%.
- ◆ Over the same period, S&P GSCI has provided an annualised return of -24.11% with a volatility of 36.85% while DJ-UBS has provided an annualised return of -14.20% with a volatility of 26.82%.
- ◆ This out-performance of UBS Comm-PASS can be attributed to its ability to trade both long and short, allowing it to avoid losses in commodity bear markets.

Notes

1. Analysis is based on month end data from January 2008 to December 2009.

Annual Return Performance⁽¹⁾

Rolling annual excess returns⁽²⁾ stable around average of 22.30% with a positively-skewed distribution⁽³⁾



Source: Bloomberg, UBS AG

Notes:

1. Year on Year returns, monthly observations, evaluated monthly from September 1998 to October 2009.
2. The negative annual returns occurs for starts dates in Sep - Nov 2000, as well as mid and late 2001.
3. Analysis uses data Involving backtesting from October 1997 to March 2007 and live performance thereafter.

Monthly Return Performance

- Positive returns in all calendar years from 1998 onwards
- Positive returns in 64.8% of months with a longest losing run of 4 months
- Average performance in up-months of 4.03%
- Average performance in down-months of -2.74%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1998	0.7%	5.3%	0.1%	1.7%	2.1%	3.0%	3.6%	4.7%	-8.7%	-0.7%	11.5%	0.3%	24.8%
1999	-0.7%	2.8%	-6.1%	5.9%	-5.2%	5.1%	4.2%	3.8%	5.7%	-2.5%	4.8%	4.0%	23.0%
2000	3.2%	6.6%	-3.7%	-2.0%	8.3%	8.3%	-3.2%	10.9%	-1.7%	1.4%	3.8%	-7.4%	25.5%
2001	2.5%	-0.7%	-0.2%	3.9%	0.6%	-3.0%	-2.3%	2.8%	2.1%	3.2%	4.8%	-0.7%	13.5%
2002	2.9%	-4.3%	-2.2%	-0.2%	-4.4%	2.5%	-1.0%	3.6%	2.6%	-4.3%	0.5%	8.5%	3.4%
2003	6.6%	8.4%	-8.1%	-4.7%	7.8%	3.4%	1.2%	-0.4%	-0.8%	2.6%	0.9%	4.5%	22.2%
2004	0.2%	7.9%	1.3%	3.3%	3.7%	-1.1%	9.9%	-0.9%	10.6%	2.0%	-2.6%	-5.5%	31.4%
2005	6.3%	3.3%	4.4%	-3.7%	-0.3%	4.8%	2.5%	9.9%	0.1%	-4.2%	-2.8%	1.9%	23.5%
2006	3.9%	-2.0%	3.2%	4.6%	1.0%	1.6%	0.4%	0.2%	-2.4%	1.2%	-3.5%	5.7%	14.3%
2007	4.8%	-2.6%	2.1%	2.2%	0.4%	-1.7%	2.7%	-3.3%	4.6%	7.0%	-1.6%	3.1%	18.7%
2008	-2.2%	4.4%	0.7%	6.7%	6.8%	8.0%	-7.9%	-3.3%	-6.8%	17.1%	12.5%	9.6%	51.8%
2009	4.1%	1.6%	-1.9%	-0.7%	-4.6%	4.7%	1.5%	1.9%	-2.5%	3.9%	-1.1%		6.6%

Data Source : Bloomberg

Notes:

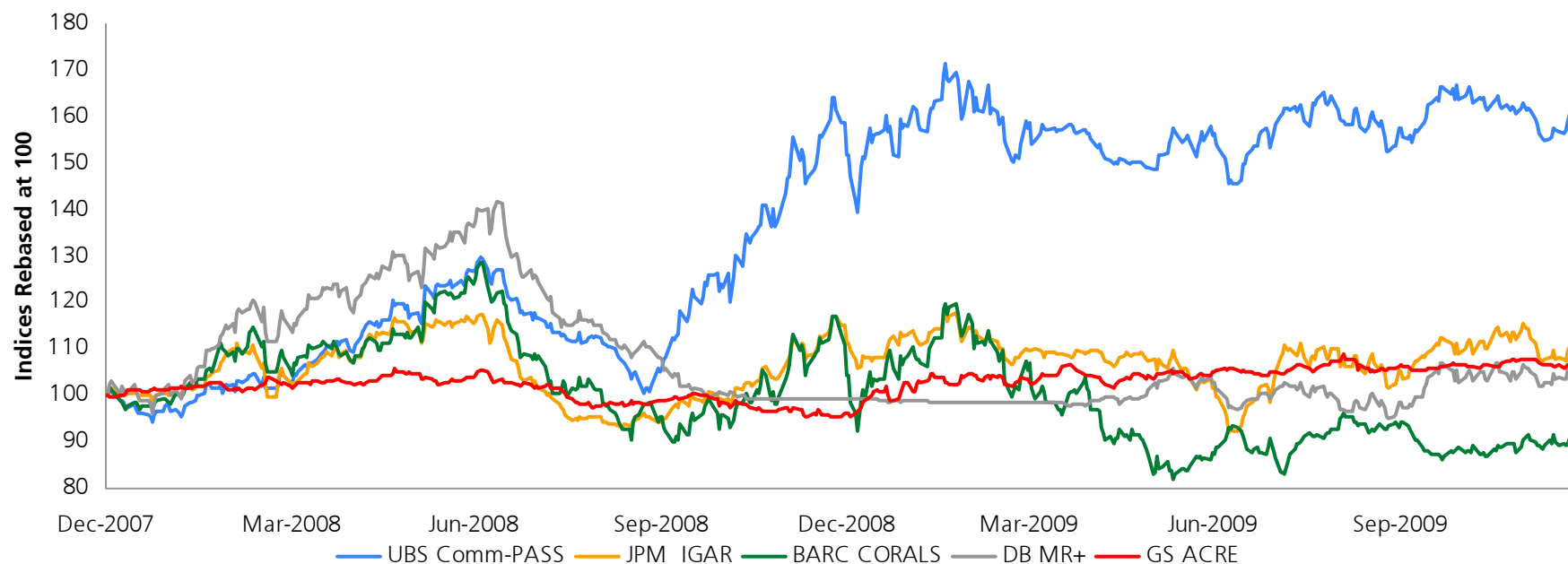
1. Important disclaimer—past performance is not indicative of future performance.
2. Month on Month returns, evaluated from October 1997 to October 2009. Data contains backtested values from October 1997 to March 2007 for UCCP1A Index and live performance thereafter.

Comparative Performance (2) – Jan 2008 To Date

UBS Comm-PASS compares well with other strategies and has strongly outperformed in 2008 and 2009

Excess Return Figures	UBS Comm-PASS	JPM IGAR	BARC CORALS	DB MR+	GS ACRE
Bloomberg Ticker	UCCP1A Index	BXII CORE Index	CMDT2SER Index	DBLCMPUE Index	GSCACRE Index
Annualised Excess Returns	27.01%	5.16%	-4.79%	3.93%	3.10%
Volatility of Excess Returns	22.14%	18.64%	27.09%	16.86%	7.19%
Sharpe Ratio	1.22	0.28	-0.18	0.23	0.43
Calmar Ratio	1.20	0.23	-0.13	0.12	0.31
Maximum Drawdown	22.5%	22.0%	36.2%	33.0%	9.9%

Notes: Data from Jan 2008 to Dec 2009, source Bloomberg and UBS IB analysis

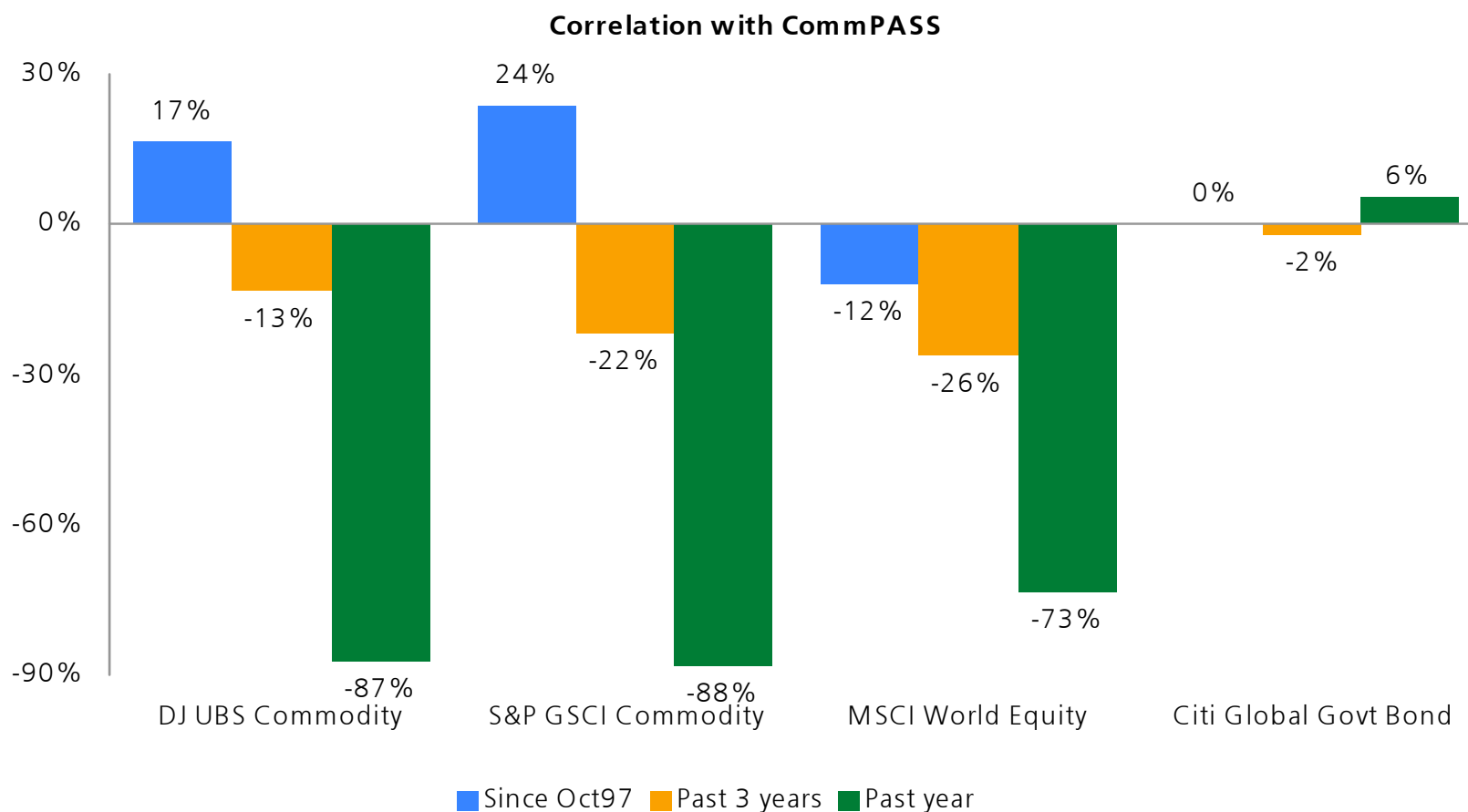


Notes

1. Graph shows rebased index levels from 31 Dec 2007 to 29 Dec 2009, period assumed to correspond to live trading.
2. Table uses full period with available daily data for all strategies.

Comparative Performance (2) – Jan 2008 To Date

UBS Comm-PASS provides excellent portfolio diversification which has improved over time



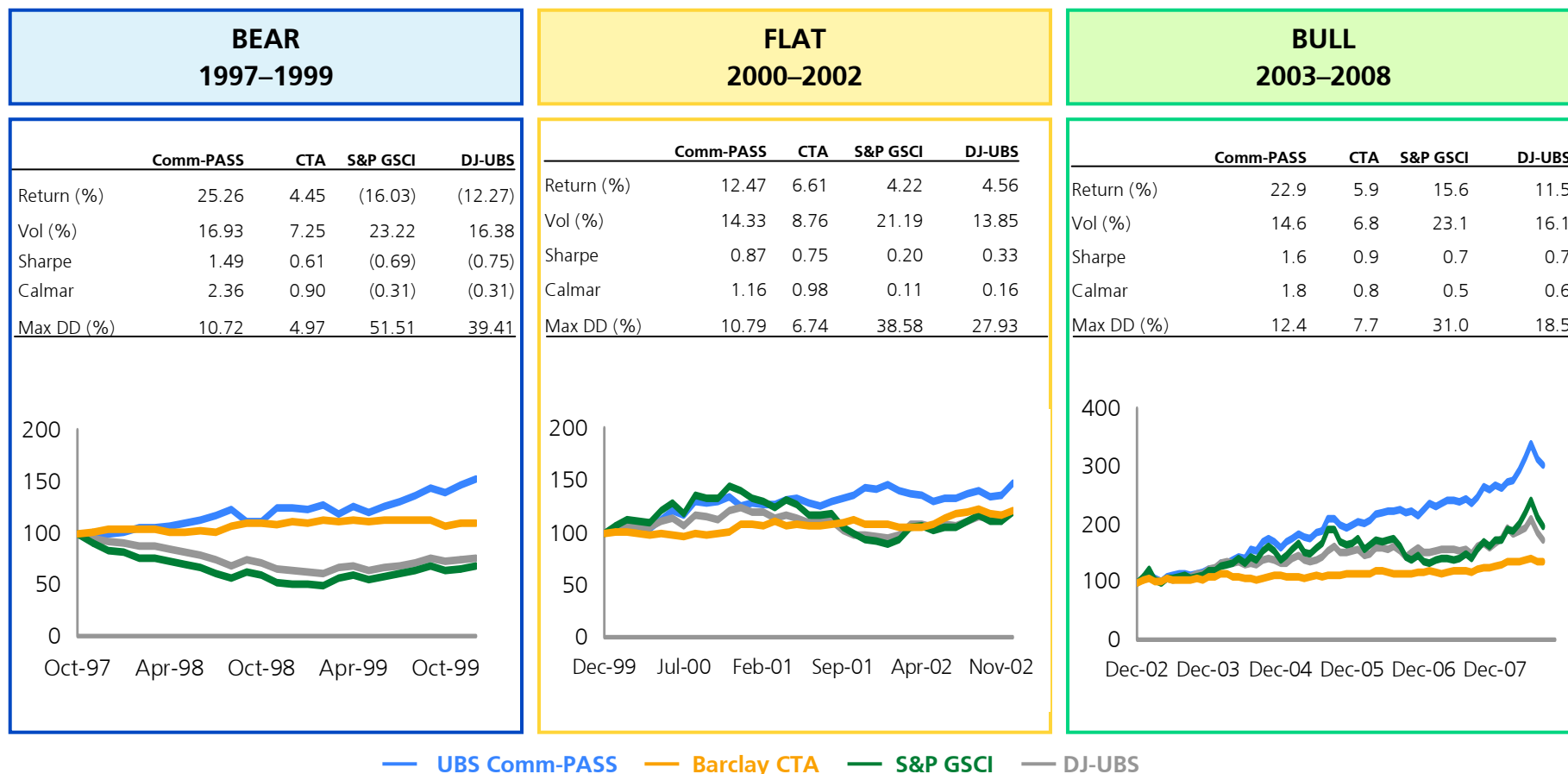
Notes:

Correlation of monthly returns from month given to October 09. Calculations made on live performance..

Source: Bloomberg, UBS Comm-PASS ticker UCCP1A, GSCI ticker SPGSCIP, Dow Jones UBS ticker DJUBS, MSCI World ticker MXWO, Citi Global Govt Bond ticker SBBIG.

Performance in Different Market Environments

Long-short approach across a portfolio of individual commodities consistently generates value across different market cycles



Source: Bloomberg, UBS AG

Notes

1. Month end data from October 1997 to August 2008.
2. Data contains backtested values from October 1997 to March 2007 for UCCP1A Index and live performance thereafter.

SECTION 4

Products on UBS Comm-PASS Total Return Indices

Investments in UBS Comm-PASS Indices

Exposure to UBS Comm-PASS Indices can be taken by investors in one of the many flexible formats available

- ◆ **Investment Formats** - Clients can access the UBS Comm-PASS index via a wide range of structures and wrappers:
 - Structures: Index tracker, levered participation, options, principal protected note
 - Wrappers: UBS issued Notes or certificates, third-party EMTNS, excess return swaps, warrants or funds
 - UBS Comm-PASS Indices are available in multiple currencies
 - Indices are available in Excess Return and Total Return formats
- ◆ **Transparency**
 - **Valuations** – UBS provides, on request, regular valuations for all investments in UBS Comm-PASS Indices. Valuations are prepared by an independent valuations team at UBS
 - **Bloomberg** – Index levels are published on Bloomberg everyday and can be seen on the USPI page
 - **Reporting** – UBS prepares reports on monthly performance of the UBS Comm-PASS Indices

UBS Open End Tracker Certificate (USD)

Issuer (Rating)	UBS AG, Jersey Branch (Aa3, A+, A+)
Lead Manager	UBS Limited, London
Valor / ISIN	10572935 / CH0105729351
SVSP Product Name	Tracker Certificate (1300)
Underlying	UBS Comm-PASS USD Total Return Index Bloomberg Page: UCCP1TR The Underlying reflects the performance of the UBS Comm-PASS USD Excess Return Index (Bloomberg page UCCP1A) net of Management Fees and including interest earned on the cash collateral (total return index).
Underlying Participation	100%
Pricing Date	04.01.2010
Redemption Date / Tenor	Open ended, subject to being called by the issuer and/or put by the investor, or a stop loss event
Issue Price	USD 1209.46
Settlement	Cash in USD
Exchange	No Listing
Management Fees	1.75% p.a.
Stop Loss Level	USD 604.75 (50% of the Initial Underlying Level)
Stop Loss Event	A Stop-Loss Event has occurred if on any Business Day after the Pricing Date, the Underlying Level falls below the Stop Loss Level, as determined by the Calculation Agent.
Public Offering in	CH, DE, LU, AT, ES, GB
Selling Restrictions	USA, US Persons, HK, Singapore, Europe (in EEA jurisdictions min. investment of EUR 50,000 or equivalent unless locally registered). See termsheet for details.

IMPORTANT INFORMATION

The publication of the level of the UBS Comm-PASS EUR Total Return Index is in the sole and absolute discretion of UBS. UBS does not guarantee the calculation or publication of the level of the UBS Comm-PASS EUR Total Return Index in a timely manner, and such calculation and/or publication may cease at any time. UBS shall not be liable for any disruption in the non-publication of the level of the UBS Comm-PASS EUR Total Return Index for reasons it deems to be beyond its control, including but not limited to disruption events in relation to any of the underlying future contracts. UBS does not make any warranty, representation, guarantee or assurance whatsoever, express or implied, to any person, in relation to the Index including, without limitation, as to:

- the accuracy or completeness of the published levels of the Index and its calculation or any other information related to the Index. UBS may correct any such level or information at any time, and such corrections may be retrospective;
- the ongoing composition or calculation methodology of the Index, either of which may change at any time without notice. Any of the information contained in this memorandum may change at any time; or -the results that may be obtained by any use of the Index, or the figures or levels at which the may Index stand at any particular day(s), time or period(s) of time.

UBS Open End Tracker Certificate (EUR)

Issuer (Rating)	UBS AG, Jersey Branch (Aa3, A+, A+)
Lead Manager	UBS Limited, London
Valor / ISIN	10572936 / CH0105729369
SVSP Product Name	Tracker Certificate (1300)
Underlying	UBS Comm-PASS EUR Total Return Index Bloomberg Page UCCP1TRE The Underlying reflects the performance of the UBS Comm-PASS USD Excess Return Index (Bloomberg page UCCP1A) net of Management Fees and including interest earned on the cash collateral (total return index).
Underlying Participation	100%
Pricing Date	04.01.2010
Redemption Date / Tenor	Open ended, subject to being called by the issuer and/or put by the investor, or a stop loss event
Issue Price	EUR 1164.70
Settlement	Cash in EUR
Exchange	No Listing
Management Fees	1.85% p.a.
Stop Loss Level	EUR 582.35 (50% of the Initial Underlying Level)
Stop Loss Event	A Stop-Loss Event has occurred if on any Business Day after the Pricing Date, the Underlying Level falls below the Stop Loss Level, as determined by the Calculation Agent.
Public Offering in	CH, DE, LU, AT, ES, GB
Selling Restrictions	USA, US Persons, HK, Singapore, Europe (in EEA jurisdictions min. investment of EUR 50,000 or equivalent unless locally registered). See termsheet for details.

IMPORTANT INFORMATION

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- the accuracy or completeness of the published levels of the Index and its calculation or any other information related to the Index. UBS may correct any such level or information at any time, and such corrections may be retrospective;
- the ongoing composition or calculation methodology of the Index, either of which may change at any time without notice. Any of the information contained in this memorandum may change at any time; or - the results that may be obtained by any use of the Index, or the figures or levels at which the may Index stand at any particular day(s), time or period(s) of time.

SECTION 5

Conclusion

Conclusion

- ◆ UBS CommPASS Index tracks the performance of an active commodity portfolio strategy that exploits trending/counter trending nature of commodity markets to generate excess returns that are uncorrelated with benchmark commodity indices.
- ◆ Similar to other UBS Strategy Indices, the CommPASS Index is constructed as a completely transparent strategy in a glass-box format with rules and underlying positions known to investors.
- ◆ Special attention is paid to liquidity considerations during the design (through weight allocation) and implementation (choice of underlying futures contracts) of the strategy- this in turn allows UBS to provide daily liquidity and valuation for products linked to the index.
- ◆ Index is calculated and posted on Bloomberg and/or Reuters daily by the Structured Products Research team.
- ◆ The strategy has an impressive performance throughout the bull as well as bear periods with a Sharpe Ratio of 1.3+ since 1997, while staying non-correlated to beta benchmarks.
- ◆ A wide number of products and flexible wrapper formats linked to the index are available for clients to access this unique strategy, including a UCITS3 compliant fund to be launched in Q1-2010.

APPENDIX A

Sources of Value in Commodity Markets

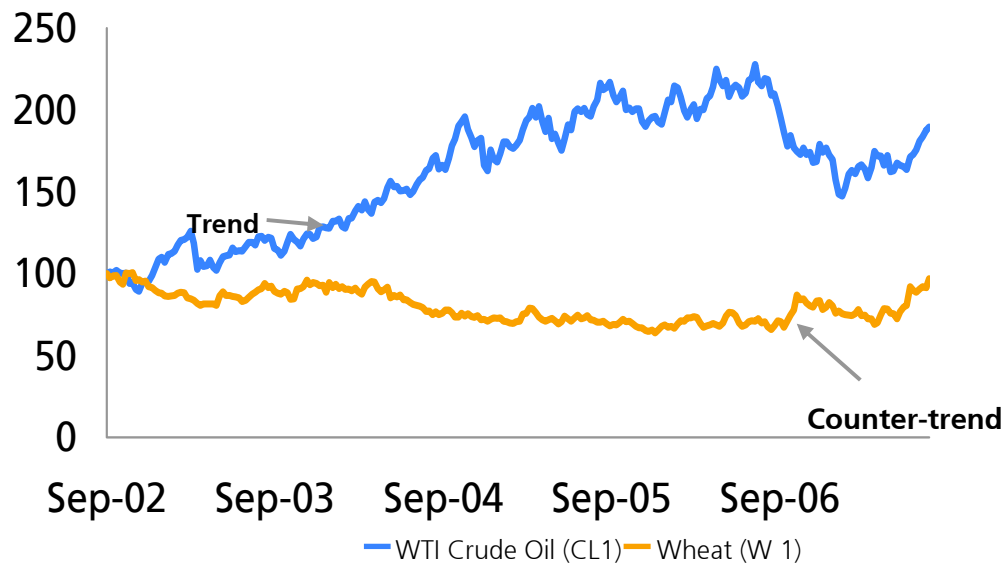
Commodity Market Characteristics: Exploit Trend and Counter-Trend

Some commodities trend while others counter-trend

- ◆ Definitions
 - Trending: after a trend, upwards or downwards, is detected the subsequent movement tends to be in the *same direction*
 - Counter-trending: after a trend, upwards or downwards, is detected the subsequent movement tends to be in the *opposite direction*
- ◆ Each commodity in the portfolio is classified as trending or counter-trending and the trading strategy is applied accordingly:
 - Trending:
 - 1) take a long position when price goes up because it is expected to rise
 - 2) take a short position when price goes down because it is expected to fall
 - Counter-trending:
 - 1) take a short position when price goes up because it is expected to fall
 - 2) take a long position when price goes down because it is expected to rise

Trending vs. counter-trending

Prices rebased from 1997



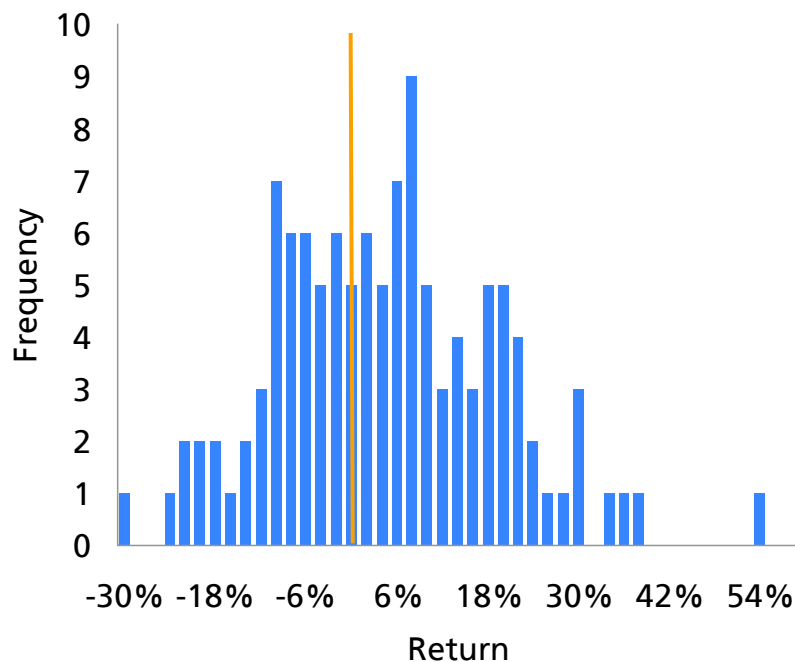
Source: Bloomberg

Commodity Market Characteristics: Exploit Asymmetric Price Action

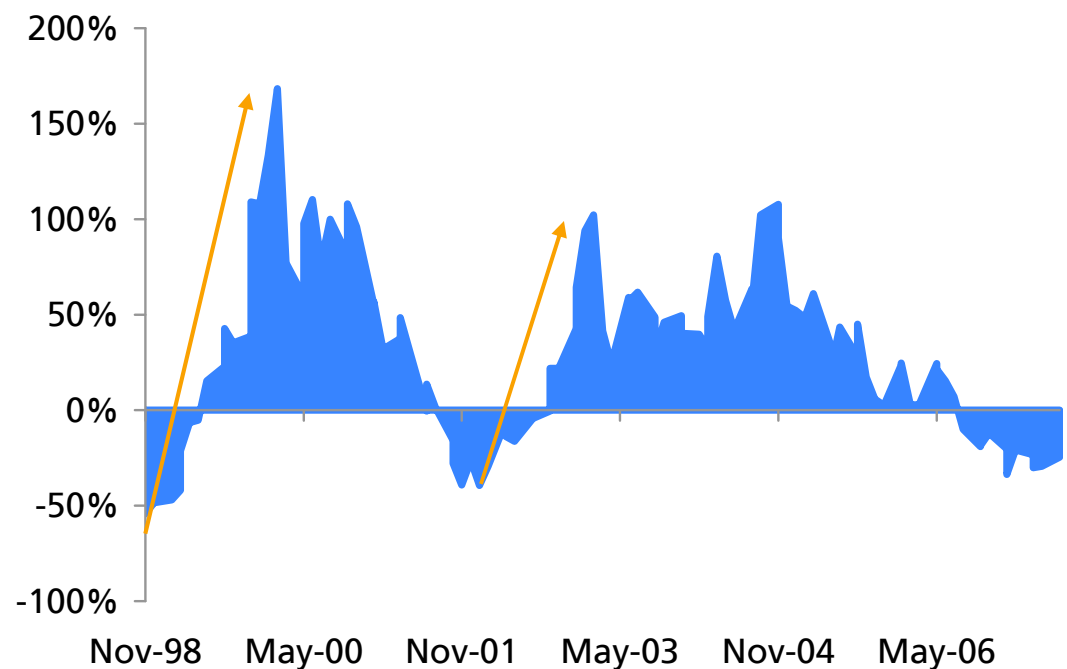
Fast upward movement versus slow downward movement

- ♦ Commodity markets typically show asymmetric price behaviour.
- ♦ In energy sector, price tends to have larger upside than downside moves. This results mainly from fundamental factors;
 - commodity end users are far more sensitive to sudden supply shortages than to excess supply : in the event of a shortage they may have to shut down production completely
 - during a crisis, as a result of a sudden scarcity in a physical commodity market, the price tends to jump
 - on the other hand, oversupply tends to lead to a more gradual decline in prices

WTI crude oil 2-month return distribution



WTI Crude Oil Annual Return



Notes:

1 Analysis is based on roll adjusted WTI front-month contract (CL1) from 31st October 1997 to 30th July 2007

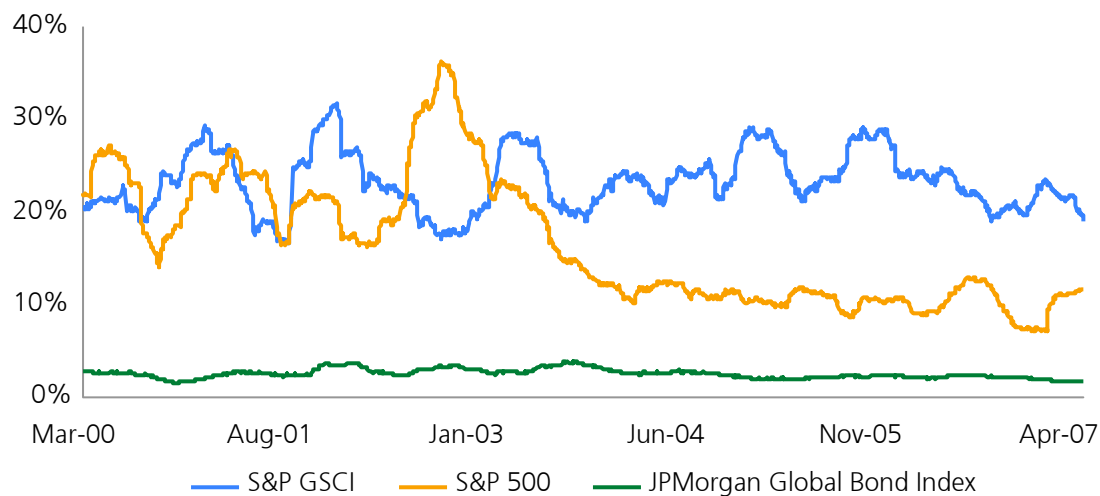
Source: Bloomberg, UBS AG

Commodity Market Characteristics: Exploit High Volatility

Volatility creates trading opportunities

- ♦ Commodity price volatility has been substantially greater than that of other asset classes (particularly since 2004)
This was largely due to supply concerns as well as changes in global consumption and the influx of financial commodity investments.
- ♦ High volatility offers trading opportunities provided an appropriate strategy is implemented
 - Each commodity in UBS Comm-PASS has its own trading strategy, ultimately reducing risk in the portfolio

3-Month Moving Volatility



Source: Bloomberg

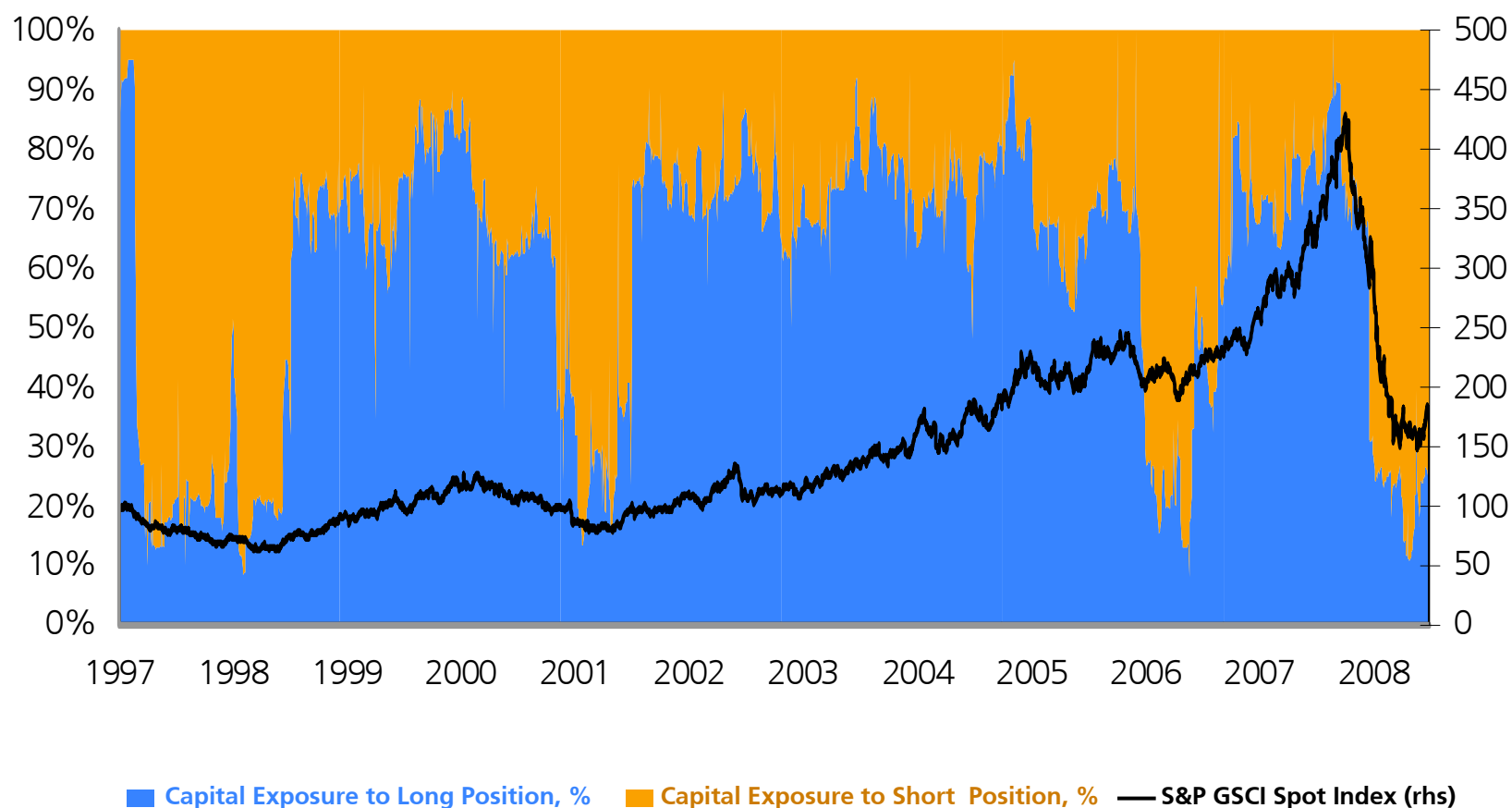
Average volatility

S&P GSCI	23.3%
S&P 500	16.6%
JP Morgan GBI	2.6%

Comm-PASS - Capturing the Trends

Key is Comm-PASS's ability to pick up changing trends in a timely manner while avoiding the costs associated with short term price trend reversals

- ◆ The following graph shows total long/short positions based on mark-to-market value.
- ◆ The majority of the portfolio's value is exposed to long positions during bull periods and short positions during bear period.



Source: Bloomberg, UBS AG



Important disclaimer: Past performance is not indicative of future performance.

APPENDIX B

Parameter Mechanics, Other Discussion

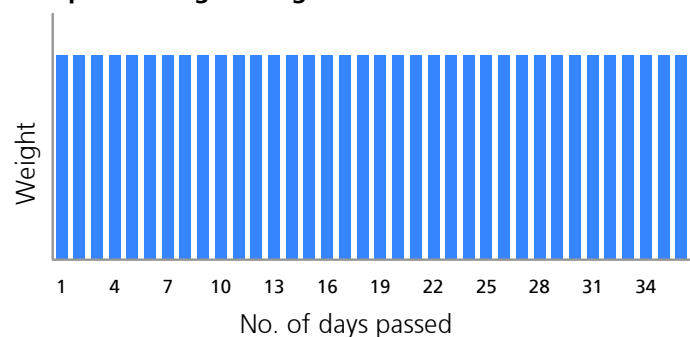
Exponential Moving Average

Identify trend with more weight on recent data

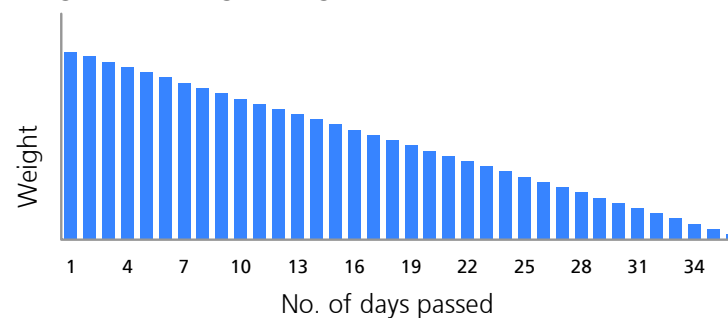
- ◆ The strategy exploits trending and counter-trending behaviour in commodities, based on a combination of exponential moving average technical indicators.
- ◆ The moving average is one of the most commonly used tools in technical analysis for time series data. It smoothes out short-term fluctuations and makes it easier to identify longer-term trends. This is especially useful in volatile markets like commodities.
- ◆ The exponential feature places greater reliance on data that has occurred more recently, in the moving average window.
- ◆ The 'decay factor'¹ of each exponential moving average is based on the window length of that particular moving average.

Weight reliance on past data by each technique

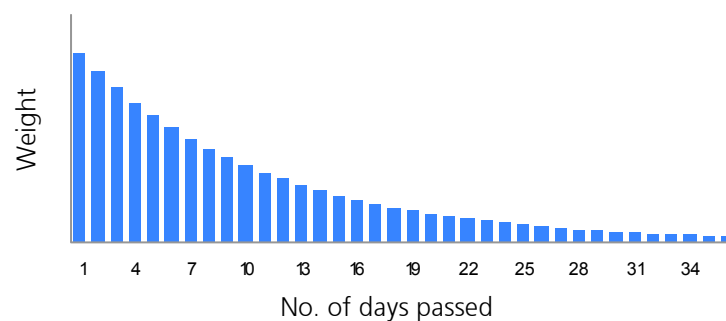
Simple Moving Average



Weighted Moving Average



Exponential Moving Average



Source: UBS AG

Notes:

¹ The degree of weighing decrease

Combining the the EMAs

- ◆ The following rules explain how to combine the Go long pair and Go short pair

Trigger from each pair

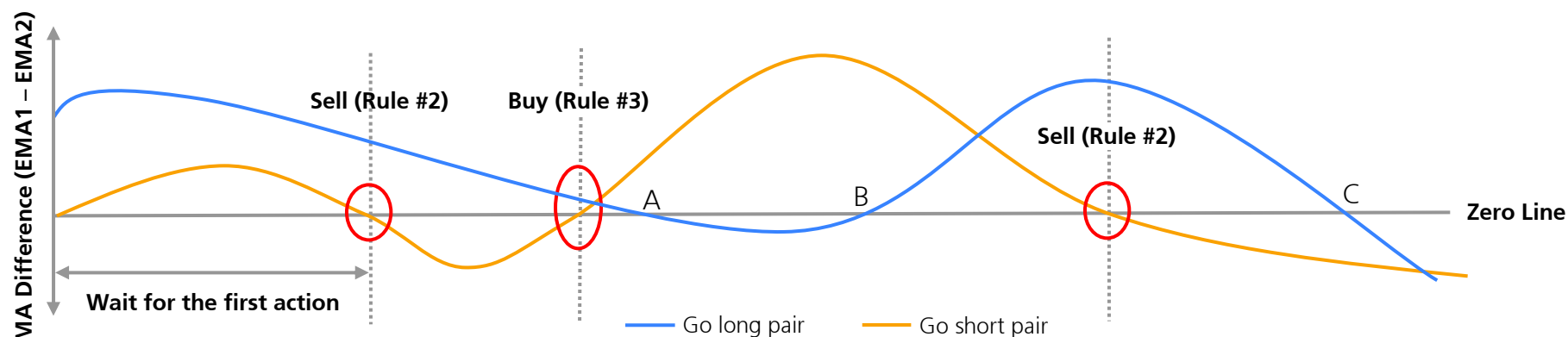
1. When the 'Go long pair' changes its signal from 'go short' to 'go long' → Buy
2. When the 'Go short pair' changes its signal from 'go long' to 'go short' → Sell

Agreement of both pairs

3. When both the 'Go long pair' and 'Go short pair' signal 'go long' → Buy
4. When both the 'Go long pair' and 'Go short pair' signal 'go short' → Sell

- ◆ Example:

- The x-axis or zero-line (grey line) shows changes over time
- The y-axis shows the difference between two moving averages (EMA1 – EMA2)
- This graph shows the evolution of two pairs of moving averages: the 'Go long pair' (blue) & the 'Go short pair' (orange). Action is taken when one of the four rules is applicable. This may happen when a line crosses the x-axis.
 - the pair signals 'go long' when the blue line is above zero, $EMA1_{Go\ long\ pair} > EMA2_{Go\ long\ pair}$
 - the pair signals 'go short' when the orange line is below zero, $EMA1_{Go\ short\ pair} < EMA2_{Go\ short\ pair}$
- The following example applies rules 2 and 3 only



Notes:

- A) We are currently long and rules 2 and 4 do not apply, therefore no action occurs
- B) Rule #1 applies but the strategy is already long, therefore no action required
- C) Rule #4 applies but the strategy is already short, therefore no action required

Defining the Portfolio Parameters

Exponential Moving averages are used to indicate coming price action.

- ◆ The model for each commodity consists of two pairs of exponential moving averages. One of the pairs is responsible for issuing long signals (buy); the other for short signals (sell).
- ◆ Each moving average requires a length of the window over which the moving average is calculated.
- ◆ Each of the 19 strategies has three distinct parameters, X, Y and TM. These three parameters identify the four window lengths, in trading days, for the four exponential moving averages:
 - X is the length, in trading days, for the first EMA of the pair responsible for issuing long signals ("Go Long" pair)
 - $X*TM$ is the length, in trading days, for the second EMA of the pair responsible for issuing long signals ("Go Long" pair)
 - Y is the length, in trading days, for the first EMA of the pair responsible for issuing short signals ("Go Short" pair)
 - $Y*TM$ is the length, in trading days, for the second EMA of the pair responsible for issuing short signals ("Go Short" pair)

	EMA1	EMA2
"Go Long" pair	X	$X*TM$
"Go Short" pair	Y	$Y*TM$

- ◆ If the parameters X and Y were equal in value, the model would have been symmetric with respect to long and short trading signals. However this is not the case, the difference in windows length between both pairs reflects the asymmetric nature of commodity markets
- ◆ The three parameters are calibrated using heat-maps, which show risk/return performance based on systematic variation in the parameters. The objective is to identify areas of 'heat', which are relatively insensitive to small changes in the parameters
- ◆ The parameters are revised annually to reflect current market conditions

Full Strategy Parameters

Sectors	Commodities	Key "Go Long" Pair		Key "Go Short" Pair		TM
		EMA1, X	EMA2	EMA1, Y	EMA2	
Energy	WTI Crude*	55	66	70	84	1.20
	Brent Crude*	35	42	70	84	1.20
	Gas Oil	35	49	70	98	1.40
	Gasoline RBOB*	25	40	80	128	1.60
	Heating Oil	25	34	95	127	1.34
	Natural Gas	55	74	40	54	1.34
Precious metals	Gold*	90	36	90	36	0.40
	Silver*	80	32	95	38	0.40
Base Metals	Copper	20	24	50	59	1.18
	Aluminium*	20	12	100	60	0.60
	Zinc	95	127	40	54	1.34
	Nickel*	60	84	50	70	1.40
	Lead*	105	137	40	52	1.30
	Sugar #11	100	130	40	52	1.30
Agriculture	Corn*	110	132	20	24	1.20
	Soybean	100	120	30	36	1.20
	Wheat*	115	46	45	18	0.40
	Coffee	70	55	25	20	0.78
Livestock	Live Cattle	90	77	65	55	0.85

X = EMA1 of "Go Long" pair

Y = EMA1 of "Go Short" pair

EMA = Exp Moving Average, as measured in Business Days

TM = Trend Measure

TM > 1, Commodity is "trending"

TM < 1, Commodity is "counter-trending"

Three distinct parameters for the strategy on Soybean commodity. X=100 days, Y=30 days, TM = 1.2

$$\begin{aligned} \text{EMA2} &= X * \text{TM} \\ &= 100 \times 1.20 \\ &= 120 \end{aligned}$$

$$\begin{aligned} \text{EMA2} &= Y * \text{TM} \\ &= 30 \times 1.20 \\ &= 36 \end{aligned}$$

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