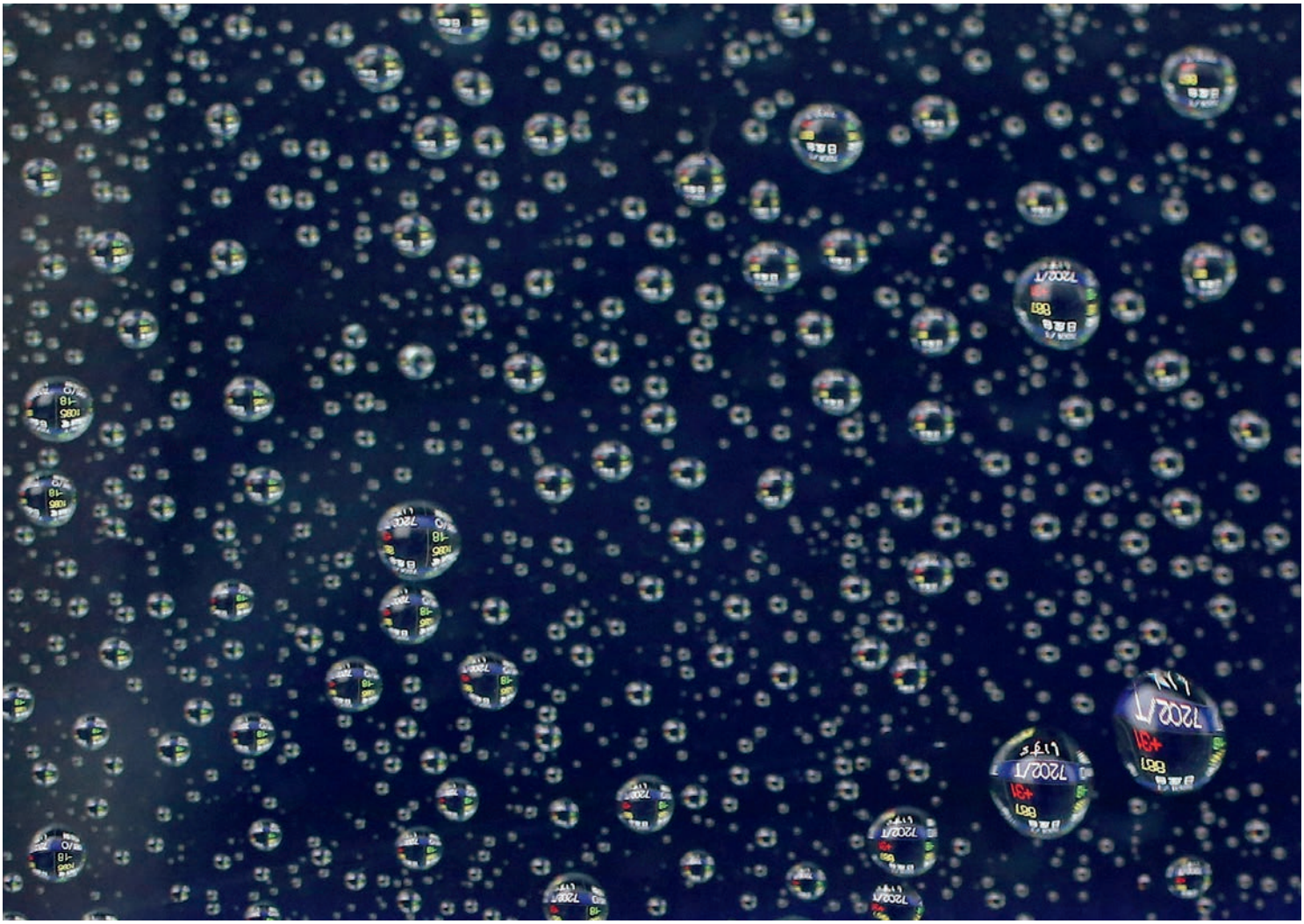

REUTERS/YUYA SHINO

MARKETPSYCH
SENTIMENT DATA IN THE FOREIGN EXCHANGE MARKETS

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THOMSON REUTERS™

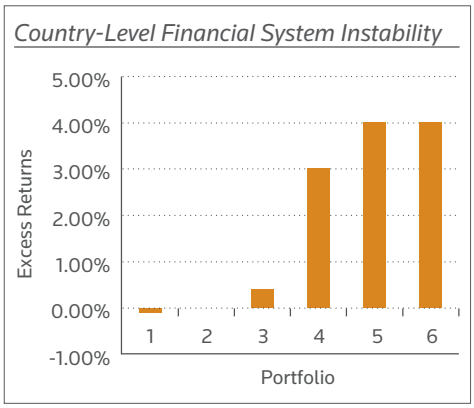
EXECUTIVE SUMMARY

Financial markets are not entirely efficient in pricing all available information; they are known to show systematic and repeating patterns that are apparently irrational – or "nonoptimal" in academic parlance.

Behavioral economics studies have linked investor mood to this nonoptimal behavior. For example, recent academic research into patterns in the FOREX market has suggested that sentiment plays a role.

We attempted to explain one of these patterns using Thomson Reuters MarketPsych Indices (TRMI). These multidimensional sentiment indices, exclusively published by Thomson Reuters, offer a proxy for the mood of investors and their perceptions of macroeconomic events in the Financial Markets.

It is important to determine which signals are consistently predictive, and to quantify what they offer; used properly, they can predict rates movement accurately enough to generate superior returns at lower risk.



Our results show that a number of the TRMI indices are correlated with excess returns in the FOREX market. A handful of these show power over a wide range of currencies and a 15-year time period. For these few indices, we find annualized 4%–5% excess returns, with attractively low levels of associated risk.

For example, our country-level index on financial system instability shows that this index provides a contrarian signal.

Here, the rightmost portfolios represent buying currencies with high levels of uncertainty, negativity and fear around their financial systems. The leftmost portfolios represent buying currencies from countries with low levels of financial system instability.

This strategy leads to average monthly annualized returns of 4%.

It is one of five strategies that we look at in this paper.

REUTERS/ALEX GRIMM

THE FORWARD PREMIUM PUZZLE

The foreign exchange market – the world's largest financial market – is generally efficient, but there is consistent empirical evidence of the "forward premium puzzle," which is that high-interest-rate currencies tend to offer superior returns compared to low-interest-rate currencies. Investor irrationality is often cited as a possible explanation.

BACKGROUND

From Fama's seminal 1984 paper, Forward and Spot Exchange Rates, through to Lustig et al.'s 2012 Common Risk Factors in Currency Markets, the apparent irrationality in FOREX markets is not a novel research problem, but is nevertheless one that remains to this day.

Recent work, such as Yu's 2013 paper A Sentiment-based Explanation of the Forward Premium Puzzle suggests that *sentiment* – the mood of investors and market participants – may help to explain this puzzle. The MarketPsych Currency- and Country-level Indices are real-time proxies for sentiment, when building a model of FOREX spot prices.

AN EXAMPLE

"Profit," in the foreign exchange markets, is generally the sum of gains made through changes in the spot price of a currency pair and the forward premium: the risk-free interest rate differential between two countries.

If I were to borrow $1m USD today at 2%, and use it to buy an equivalent amount of Brazilian $R, I could then invest that money in Brazil at 5%.

In three months' time, I might then wish to convert this money back to USD, expecting to have made 3% profit thanks to this interest rate difference. An efficient market should, however, have arbitraged away this opportunity, lowering the USD/BRL spot price to give me a net profit of 0.

Over a large time period and all currencies, this is not the case, and this phenomenon is known as the Forward Premium Puzzle; it is the subject of much academic and industry-led research.

MARKETPSYCH INDICES

The Thomson Reuters MarketPsych Indices give granular sentiment scores for currencies and countries, on both mood-based topics (such as Joy or Fear), and macro- or currency-specific topics (such as Economic Uncertainty Instability or Government Anger). To create these ever-changing scores, millions of documents are processed each day from news and social media sources. MarketPsych uses innovative language models powered by sophisticated expert systems.

Just consider the following phrase:

> *"...traders seem **hopeful** that the Yen will **bounce back** from its recent slump."*

Alone, this fragment has very little influence, but when thousands of news stories and social media sources are making similar predictions and observations, this gets reflected in the MarketPsych indices for the Yen; it can provide a real clue as to where people think the market is going and is scored on the Yen Price Forecast TRMI.

We considered the full range of indices offered by MarketPsych for countries and currencies. Many of these showed predictive power in certain regimes, for certain currencies and currency-types within certain time periods. On top of this, a few stood out as generally predictive in a very wide range of conditions to offer a broad and powerful signal.

We posit that investment professionals in the foreign exchange markets would do well to stay informed of general sentiment, in addition to their usual arsenal of fundamentals data, and that MarketPsych data can provide a real and usable proxy for this sentiment.

SENTIMENT EXPLAINED

MarketPsych offers 52 basic sentiment indices for currencies and countries. Some of these are consistently predictive and others perform well under certain conditions. While the approach and breadth offered by MarketPsych are novel, this is by no means the first application of sentiment data to the markets.

SENTIMENT IN THE MARKETS

Any sentiment index aims, at its core, to represent the psyche of the aggregate investment professional whose actions will lead to price changes in the market. Many neuroscience publications relate this to activation of the brain's reward system, or its loss avoidance system, and studies have shown irrational behavior linked to weather (Krivelyova and Robotti, 2003), to recent market activity (Fisher and Statman, 2000) and public mood (Bollen et al., 2011).

Baker & Wurgler's oft-cited Investor Sentiment in the Stock Market uses a number of market factors, such as puts vs. calls, to calculate the implied investor sentiment in the equities market through market actions, with good success. Bollen et al. use Twitter® data to calculate public mood around given equities, and again enjoy success.

> *"The market can remain irrational a lot longer than you or I can remain solvent."*
>
> –John Maynard Keynes

In the Forward Premium Puzzle, we see constant empirical evidence of irrationality in the foreign exchange market. This behavior can be linked to sentiment, and sentiment has been proven predictive in the equity markets. Recent research, such as Yu's 2013 paper A Sentiment-based Explanation of the Forward Premium Puzzle, begins to show how, with a good sentiment index, similar successes could be found in the foreign exchange market.

MARKETPSYCH INDICES

Mood-based indices are available for all currencies and countries. For concepts such as Joy, Fear, Optimism and Uncertainty, among others, these represent the aggregate mood of those writing about a given asset. Uncertainty around Greece, for example, is extremely high around the debt crises in late 2009.

Asset-class specific indices are also available for currencies and countries. Positive and negative references to a given country's economic growth, for example, are aggregated into the "Economic Growth" index.

Certain indices may be sparse: the Danish Kroner, for example, is the subject of relatively little discussion and is therefore the sparsest index we considered. The currency-specific "Currency Peg Instability" index is, as expected, only used for currencies that are actually pegged. Appendix B contains further information on available indices and their use.

MARKETPSYCH, QU'EST-QUE C'EST?

The MarketPsych Indices are calculated from news and social media text. News data is collected from a host of mainstream news sources and top business publications, featuring the entire Reuters news feed and high-quality Internet news from Moreover Technologies. Social media data is collected from top finance-related blogs, microblogs and tweets, as ranked by popularity indices.

Indices are calculated minutely; an indication of the number of articles (the "buzz") contributing to the indices for a given asset (country/currency) is provided for each set of data points.

FINDING ALPHA

With 26 currencies and 52 sentiment indices, we have a wealth of information available to us, but it takes some work to determine which signals are consistently predictive, and to quantify what they offer.

We set out to find the indices that are most historically predictive. These are shown in detail in Appendix A. For completeness, Appendix B shows the NA values for each index in each currency – how often there is insufficient source data to generate a value.

MEASURING ALPHA

We measured the fit of MarketPsych Indices, individually, as independent variables against forward premiums and spot-price movements. We used the Fama-Macbeth regression for panel analysis over all currencies, and used a Newey-West estimator to correct for autocorrelation and heteroskedasticity in single-currency regressions.

For the top performers listed, we found p-values below 0.05 and high r^2 values in panel regressions using 26 currencies against the USD in a 15-year time period from 1998 to 2013.

Further, portfolio testing showed significant trending in profit towards portfolios composed of currencies with higher sentiment values in a given month, for all four top performing indices with monthly High-Minus-Low means of +4%, and Sharpe Ratios from 0.4 to 0.6.

PORTFOLIO TESTING

We used MarketPsych sentiment data for 26 currencies against the USD, in a 15-year time period from 1998 to 2013 in order to create six monthly portfolios (baskets) of currencies. We did this for each individual high-performing sentiment index separately.

We did not consider currencies in a month where they had few sentiment scores for the given index. There was little news discussing instability in the Danish financial system in February 2006, for example, thus the DKK did not feature in portfolios for that index in March 2006. The average monthly portfolio contained four currencies.

Profit was calculated as the difference in spot prices for a given currency vs. the USD between the day of investment on the start of a month and the strike date at the end of the month, combined with the one-month forward premium (essentially the difference in risk-free interest rates) on the day of investment.

We used only out-of-sample (i.e., prior) data to form portfolios. The March 2011 monthly test, for example, only used sentiment data from February 2011 to rank currencies into six portfolios. Profit (excess returns) was defined as the percentage difference between the March 31st spot price and the March 1st spot price, plus the one-month forward premium at March 1st.

Detailed results are presented in Appendix A.

REVEALING THE TOP PERFORMERS

We found a number of sentiment indices that performed well for only a given few currencies, or only in given market conditions. Others were found to be highly reflective of market movements, but lacked significant predictive power.

Five indices, however, show predictive power in a wide range of conditions, over all currencies considered in a long time frame.

CO_ECONGRW (Economic Growth) and **CO_EC_UNCR** (Economic Uncertainty) measure statements in text around growth of the economy and uncertainty, respectively. The economy, in this case, is defined as all of its constituent parts, from phrases about individual business entities all the way up to general text around a given country's economy.

It is already widely accepted that numbers such as consumption growth are predictive of spot-price movements. These indices do not simply serve as a proxy, or a peek ahead at the figures. Sentiment around these topics instead reflects investor beliefs and emotion around these fundamentals. It is beliefs that move markets in the short term, as these indices show.

We further found **CO_FNSYSIN** (Financial System Instability), a narrower signal based only on discussion explicitly relating to a country's financial system, **CO_TRUST** (Country-Level Trust) and **CU_UNCERTN** (Currency-Level Uncertainty) to be predictive in a wide range of market conditions.

These indices, found to be similar to and slightly predictive of, market volatility, show investor sentiment around a given country's overall economic health and stability – a natural factor in trading decisions.

They represent a rational way of exploiting sentiment – and for finding alpha.

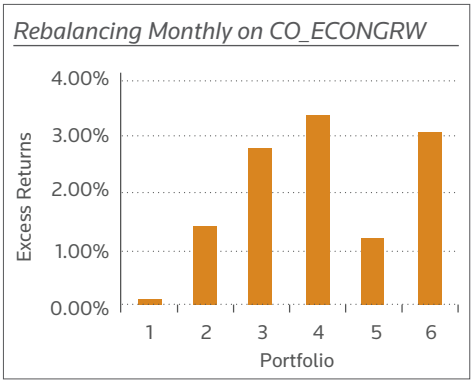
Appendix A: Portfolio Trading, 04/2006 to 05/2013

Evenly split portfolios, containing all currencies with available data (average four per portfolio) for each month, were rebalanced monthly based on an average of the previous month's sentiment index. We then calculated the excess returns (forward premium + spot change) against the USD for the following month.

In practice, this would involve investing in currencies 4, 5 and 6 and selling or shorting the currencies 1, 2 and 3.

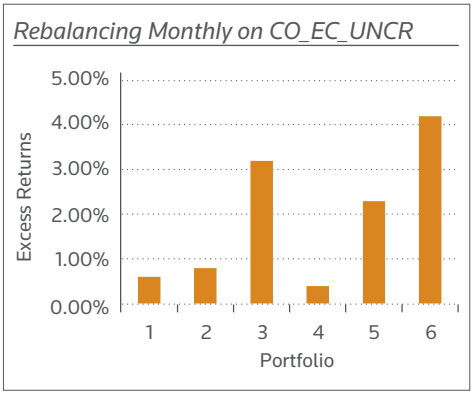
CO_ECONGRW (Country-Level, Economic Growth)

Portfolio Number		1	2	3	4	5	6
Spot	Mean	1.70%	0.30%	-1.10%	-1.70%	0.00%	-1.60%
	SD	7.80%	9.90%	9.20%	10.10%	8.70%	10.00%
Premium	Mean	1.80%	1.70%	1.70%	1.70%	1.20%	1.50%
	SD	0.50%	0.50%	0.60%	0.60%	0.50%	0.60%
Excess	**Mean**	**0.10%**	**1.40%**	**2.80%**	**3.40%**	**1.20%**	**3.10%**
	SD	7.80%	9.80%	9.20%	10.00%	8.70%	10.00%
	SR	0.0128	0.1429	0.3043	0.34	0.1379	0.31
Switching Frequency		50.30%	68.98%	85.24%	77.41%	71.39%	53.01%
Sentiment Mean		-0.0102	-0.0028	0.0011	0.0057	0.0104	0.018
HML	Mean	NA	1.38%	2.74%	3.33%	1.14%	3.00%
	SD	NA	7.44%	6.07%	7.03%	5.81%	7.16%
	SR	NA	0.1855	0.4514	0.4737	0.1962	0.419
Avg Switch Freq	67.72%						



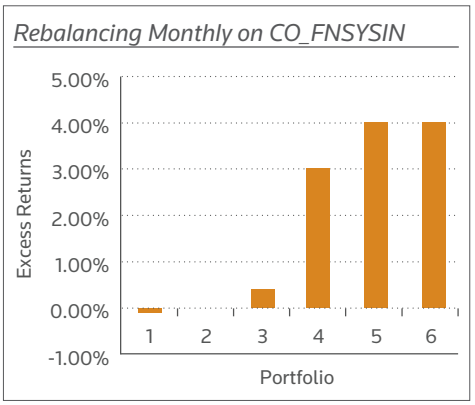
CO_EC_UNCR (Country-Level, Economic Uncertainty)

Portfolio Number		1	2	3	4	5	6
Spot	Mean	0.20%	0.50%	-1.10%	1.70%	-0.30%	-2.90%
	SD	9.60%	9.30%	9.00%	10.30%	8.40%	8.90%
Premium	Mean	0.80%	1.30%	2.10%	2.10%	2.00%	1.30%
	SD	0.40%	0.50%	0.60%	0.60%	0.60%	0.60%
Excess	**Mean**	**0.60%**	**0.80%**	**3.20%**	**0.40%**	**2.30%**	**4.20%**
	SD	9.40%	9.20%	8.90%	10.30%	8.40%	8.90%
	SR	0.0638	0.087	0.3596	0.0388	0.2738	0.4719
Switching Frequency		58.13%	72.89%	87.65%	76.20%	76.51%	63.25%
Sentiment Mean		-0.0023	-0.0007	0.0001	0.0006	0.0012	0.0027
HML	Mean	NA	0.16%	2.53%	-0.26%	1.70%	3.56%
	SD	NA	4.61%	4.89%	5.46%	5.64%	6.27%
	SR	NA	0.0347	0.5174	-0.0476	0.3014	0.5678
Avg Switch Freq	72.44%						



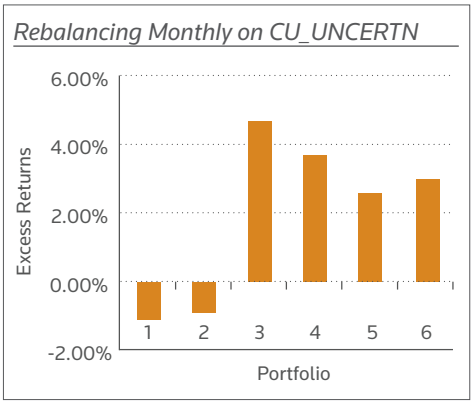
CO_FNSYSIN (Country-Level, Financial System Instability)

Portfolio Number		1	2	3	4	5	6
Spot	Mean	1.60%	1.60%	1.30%	-0.90%	-2.70%	-3.00%
	SD	9.70%	8.70%	10.20%	9.40%	9.40%	9.90%
Premium	Mean	1.50%	1.60%	1.70%	2.00%	1.40%	1.00%
	SD	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%
Excess	**Mean**	**-0.10%**	**0.00%**	**0.40%**	**3.00%**	**4.00%**	**5.00%**
	SD	9.60%	8.70%	10.10%	9.30%	9.30%	9.80%
	SR	-0.0104	0	0.0396	0.3226	0.4301	0.4082
Switching Frequency		50.30%	87.55%	68.07%	71.69%	74.10%	71.99%
Sentiment Mean		-0.0102	-0.0014	-0.0002	0	0.0001	0.0005
HML	Mean	NA	0.18%	0.58%	3.10%	4.19%	4.20%
	SD	NA	7.18%	7.10%	6.90%	6.85%	7.58%
	SR	NA	0.0251	0.0817	0.4493	0.6117	0.5541
Avg Switch Freq	73.23%						



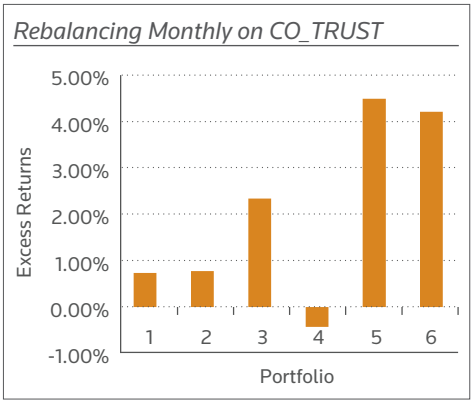
CU_UNCERTN (Currency-Level, Uncertainty)

Portfolio Number		1	2	3	4	5	6
Spot	Mean	1.80%	1.90%	-3.10%	-2.00%	-0.50%	-0.60%
	SD	9.30%	7.80%	10.60%	10.30%	9.10%	9.40%
Premium	Mean	0.70%	1.00%	1.70%	1.70%	2.20%	2.40%
	SD	0.40%	0.40%	0.50%	0.80%	0.70%	0.60%
Excess	**Mean**	**-1.10%**	**-0.90%**	**4.70%**	**3.70%**	**2.60%**	**3.00%**
	SD	9.30%	7.80%	10.60%	10.10%	9.00%	9.20%
	SR	-0.1183	-0.1154	0.4434	0.3663	0.2889	0.3261
Switching Frequency		58.13%	48.80%	66.87%	77.71%	70.48%	60.84%
Sentiment Mean		-0.0023	-0.0064	-0.0018	0.0016	0.0059	0.0166
HML	Mean	NA	0.13%	5.78%	4.77%	3.67%	4.02%
	SD	NA	6.74%	5.46%	6.28%	5.86%	6.63%
	SR	NA	0.0193	1.0586	0.7596	0.6263	0.6063
Avg Switch Freq	62.35%						



CO_TRUST (Country-Level, Trust)

Portfolio Number		1	2	3	4	5	6
Spot	Mean	0.72%	0.66%	-0.99%	1.88%	-3.01%	-1.72%
	SD	9.24%	9.24%	8.22%	10.32%	8.41%	10.99%
Premium	Mean	1.45%	1.43%	1.35%	1.46%	1.49%	2.49%
	SD	0.33%	0.42%	0.48%	0.72%	0.52%	0.81%
Excess	**Mean**	**0.74%**	**0.78%**	**2.34%**	**-0.42%**	**4.50%**	**4.21%**
	SD	9.24%	9.15%	8.20%	10.22%	8.37%	10.77%
	SR	0.0798	0.0847	0.2855	-0.0415	0.5372	0.3913
Switching Frequency		50.30%	46.69%	69.88%	79.82%	74.40%	72.29%
Sentiment Mean		-0.0102	-0.0105	-0.0023	0.0017	0.0047	0.0075
HML	Mean	NA	0.04%	1.61%	-1.16%	3.76%	3.48%
	SD	NA	6.08%	5.93%	5.81%	6.34%	7.03%
	SR	NA	0.0066	0.2715	-0.1997	0.5931	0.495
Avg Switch Freq	65.06%						



Appendix B: MarketPsych Index Coverage

This shows the percentage of Not Available (NA) values for each index/currency pairing. This is the number of times out of a hundred that the system is not able to generate a value from the source data.

We see here high NA values for PEGINST (currency peg instability) for currencies not involved in pegs, and we can see in general that the DKK is a rarely-discussed currency.

Data for indices calculated at the currency level are presented below. In addition to the standard set of MarketPsych indices, currency-level indices further include market forecast, carry trade, peg instability and market momentum.

CURRENCY	% NA VALS	BUZZ	SNTMENT	OPTIMSM	FEAR	JOY	TRUST	VIOLENC	CONFLCT	URGENCY	UNCERTN	PRICEUP	MKTFCST	CARYTRD	PEGINST	MKTMMTM
AUD	12.26	0	0	0	1.93	21.7	0.28	1.21	0.06	0.06	0.28	0	0.11	67.26	90.89	0.17
BRL	35.67	0	0	17.5	55.05	65.05	40.09	25.95	4.91	15.85	29.49	0.22	42.74	97.18	99.61	41.36
CAD	14.75	0	0	0.06	4.58	30.26	0.94	3.31	0.06	0.11	0.55	0	0.72	88.18	91.88	0.61
CHF	29.04	0	0.11	12.87	38.76	78.96	32.3	32.03	5.8	2.65	16.45	0	25.68	81.17	93.93	14.91
DKK	85.41	0	63.92	94.19	98.93	99.59	97.45	97.16	86.97	95.38	95.2	66.05	96.39	99.94	97.51	92.54
EGP	71.14	0	24.38	79.09	91.31	97.7	85.31	74.55	60.2	76.23	84.64	20.12	86.77	99.89	99.83	87.11
EUR	8.78	0	0	0	0	0	0	0	0	0	0	0	0	68.42	63.28	0
GBP	13.85	0	0	0	2.82	16.79	0.28	0.17	0	0	0.11	0	0.17	89.78	97.57	0.11
HKD	21.38	0	0	4.86	15.52	63	12.53	29.21	0.77	5.52	6.68	0	11.93	88.35	74.05	8.34
IDR	38.28	0	1.1	21.99	52.6	81.99	43.92	52.98	10	24.86	27.57	1.22	25.03	97.96	99.78	33.26
ILS	59.76	0	9.7	54.32	82.68	95.18	80.1	70.57	38.62	63.4	64.63	11.6	64.52	99.61	99.94	61.6
INR	16.65	0	0	0.55	7.68	34.29	2.48	3.42	0.22	0.55	1.82	0	0.94	98.45	97.29	1.99
JPY	9.42	0	0	0	0.06	11.37	0.11	0.11	0	0	0	0	0	32.8	96.85	0
KRW	18.25	0	0	0.88	8.34	42.3	8.72	4.14	0.11	1.77	1.88	0	4.09	98.45	99.83	3.2
MXN	36.62	0	0.17	18.88	32.3	79.85	45.83	45.06	10.22	28.49	28.44	0.39	31.53	97.79	99.23	31.14
MYR	33.55	0	0.5	10.88	48.51	77.96	42.54	42.93	6.02	16.46	19.83	0.55	19.23	99.34	97.18	21.33
NOK	78.69	0	42.26	86.12	94.8	98.86	94.17	93.77	82.35	87.66	87.61	41.01	89.32	99.6	99.83	82.98
NZD	19.77	0	0	1.71	13.47	58.31	10.33	19.99	0.55	3.09	4.2	0	7.18	77.42	97.57	2.71
RUB	56.35	0	6.45	48.3	77.88	93.83	68.09	69.76	36.13	54.42	57.53	12.01	59.31	98.67	99.39	63.48
SEK	73.28	0	26.44	74.57	91.78	97.93	87.7	91.06	73.28	81.78	83.17	27.89	83.79	99.22	99.39	81.22
SGD	20.86	0	0	2.04	11.1	60.46	7.95	23.91	0.83	3.42	5.02	0	8.06	93.04	90.67	6.46
THB	26.31	0	0.17	5.63	34.62	64.55	25.79	19.11	1.6	7.07	14.36	0.33	11.98	99.5	94.59	15.3
TRY	42.76	0	1.1	24.89	56.79	87.93	57.64	68.61	15.19	28.95	22.28	1.35	36.37	96.37	100	43.88
TWD	27.51	0	0	6.29	20.82	70.18	22.14	39.81	4.09	10.99	14.41	0	18.88	93.98	94.31	16.79
USD	4.88	0	0	0	0	0.28	0	0	0	0	0	0	0	46.94	25.95	0
ZAR	15.57	0	0.06	0.94	6.9	30.26	2.04	2.6	0.17	0.99	1.71	0.06	3.48	86.47	95.64	2.21
Averages	**33.49**	**0**	**6.78**	**21.79**	**36.51**	**59.95**	**33.41**	**35.05**	**16.85**	**23.45**	**25.69**	**7.03**	**28.01**	**88.30**	**92.15**	**27.41**

Appendix B: MarketPsych Index Coverage

This shows the percentage of Not Available (NA) values for each index/currency pairing. This is the number of times out of a hundred that the system is not able to generate a value from the source data.

Data for indices calculated at the country level (for the home country of a currency, or all Eurozone countries for the Euro) are presented below. In addition to the standard set of MarketPsych indices, country-level indices further include *market risk, trade balance, budget deficit, central bank and consumer sentiment.*

CURRENCY	NA VALUES	BUZZ	SNTMENT	OPTIMSM	FEAR	JOY	TRUST	VIOLENC	CONFLCT	URGENCY	UNCERTN	MKTRISK	TRADBAL	BDEFCIT	CENBANK	CNSMSNT
AUD	2.74	0	0	0	0	0	0	0	0	0	0	0	0.61	37.93	2.43	0.06
BRL	4.90	0	0	0	0.11	0.11	0	0	0	0	0	0	1.1	67.7	0.5	4.03
CAD	1.88	0	0	0	0	0	0	0	0	0	0	0	0.72	24.57	2.93	0
CHF	9.29	0	0	0	0.55	0.99	0	0	0	0	0	0	41.47	90.94	0	5.41
DKK	17.55	0	0	0.24	11.43	9.36	0.89	0.18	0	0.36	0.41	0	76.36	90.34	52.9	20.79
EGP	11.26	0	0	0	1.46	3.53	0.17	0	0	0	0.06	0	48.88	75.34	6.33	33.18
EUR	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0.33	0	0
GBP	1.27	0	0	0	0	0	0	0	0	0	0	0	0.61	18.44	0	0
HKD	9.84	0	0	0	0.33	0.22	0	0	0	0	0	0	24.19	87.3	29.27	6.24
IDR	5.37	0	0	0	0.17	0.28	0.06	0	0	0	0	0	3.2	62.82	3.59	10.5
ILS	9.41	0	0	0	0	0	0	0	0	0	0	0	32.23	72.03	24.89	11.94
INR	2.73	0	0	0	0	0	0	0	0	0	0	0	0	40.75	0.17	0
JPY	3.35	0	0	0	0	0	0	0	0	0	0	0	0.06	50.14	0	0
KRW	6.44	0	0	0	0	0.22	0	0	0	0	0	0	0.55	91.5	2.43	1.93
MXN	6.45	0	0	0	0.06	0.17	0	0	0	0	0	0	12.26	81.61	0.55	2.15
MYR	7.18	0	0	0	0.44	0.83	0	0.11	0	0	0	0	7.07	80	9.39	9.83
NOK	13.60	0	0	0	7.14	11.99	0.23	0.06	0	0	0.17	0	55.11	87.09	6.28	35.98
NZD	9.42	0	0	0	0.22	0.22	0	0.06	0	0.06	0	0	27.33	84.76	21.98	6.68
RUB	2.78	0	0	0	0	0.06	0	0	0	0	0	0	0.06	39.08	0.94	1.5
SEK	11.52	0	0	0	2.74	2.68	0	0	0	0.06	0	0	65.12	82.34	7.32	12.52
SGD	9.33	0	0	0	0.39	1.82	0	0	0	0	0	0	21.15	90.39	16.29	9.94
THB	7.05	0	0	0	0.06	0.28	0	0.11	0	0	0.06	0	7.62	87.02	6.63	3.98
TRY	7.22	0	0	0	0.08	0.68	0	0	0	0	0	0	18.14	73.33	0.51	15.61
TWD	7.71	0	0	0	0.61	0.99	0	0	0	0	0	0	6.07	92.27	8.72	6.96
USD	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0.17	0	0
ZAR	7.14	0	0	0	0.06	0.06	0	0	0	0	0	0	13.64	68.97	20.21	4.09
Averages	**6.75**	**0**	**0**	**0.01**	**0.99**	**1.33**	**0.05**	**0.02**	**0.00**	**0.02**	**0.03**	**0.00**	**17.83**	**64.51**	**8.63**	**7.82**

Appendix B: MarketPsych Index Coverage

This shows the percentage of Not Available (NA) values for each index/currency pairing. This is the number of times out of a hundred that the system is not able to generate a value from the source data.

As on the previous page, data for indices calculated at the country level (for the home country of a currency, or all Eurozone countries for the Euro) are presented below. Here are displayed the following country-level indices: *credit easy vs. tight, economic forecast, growth & uncertainty, election sentiment, financial system instability, fiscal policy loose vs. tight, government anger, government corruption, inflation, interest rate and investment flow.*

CURRENCY	CRDTEVT	DEFAULT	ECONCFT	ECONGRW	EC_UNCR	ELECSNT	FNSYSIN	FISCLVT	GVTANGR	GVTCORR	GVTINST	INFLATN	INTRATE	INVFLOW
AUD	0.55	3.98	0	0	0	10.22	48.92	32.47	1.49	0.28	0	0.77	0.06	71.78
BRL	8.17	17.45	1.44	0	0.11	67.48	78.91	52.79	43.73	14.96	0	2.65	1.05	57.48
CAD	0.39	0.61	0	0	0	5.58	49.92	20.04	1.71	0	0	0.33	0.06	63.22
CHF	27.83	30.09	11.15	0	1.16	89.9	69.46	87.69	66.59	36.89	1.27	14.69	11.15	96.08
DKK	59.66	72.63	40.46	0.12	13.39	91	94.67	86.49	76.66	59	5.04	61.08	68.9	98.46
EGP	55.04	69.67	22.87	0.22	15.36	59.98	94.96	83.13	29.65	24.16	0.22	46.97	15.81	78.81
EUR	0	0	0	0	0	0.55	4.47	0.88	0	0	0	0	0	25.01
GBP	0	0.06	0	0	0	3.59	19.22	7.18	0.17	0	0	0	0	70.62
HKD	13.75	44.62	12.53	0	0.83	79.68	81.12	86.97	65.99	36.28	0.61	13.53	18.94	87.96
IDR	25.36	49.23	4.64	0	1.27	53.59	84.14	62.49	29.61	4.42	0	10.83	17.4	61.22
ILS	35.26	52.41	0.78	0	0.5	41.31	87.05	70.24	3.03	0.73	0	22.48	14.74	85.76
INR	0.06	2.37	0	0	0	5.91	54.45	20.32	0.39	0.06	0	0.44	0.5	17.23
JPY	0.28	0.99	0	0	0	21.15	32.74	23.08	4.97	0.44	0	0	0.11	52.95
KRW	15.07	28.38	1.71	0	0.33	59.03	69.8	71.23	26.78	8.45	0	2.54	7.4	37.33
MXN	21.81	27	3.26	0	0.22	56.82	84.98	72.45	25.51	5.02	0	3.48	13.25	80.29
MYR	36.57	45.03	10.39	0	0.55	69.39	90.5	74.92	43.31	13.15	0	28.51	42.15	76.02
NOK	59.17	70.36	34.27	0.23	15.93	93.32	91.95	90.86	81.04	64.53	4.28	42.15	17.02	99.03
NZD	7.23	49.31	9.06	0.11	1.55	76.2	85.31	78.85	55.33	27.17	0.5	20.65	3.31	92.49
RUB	4.45	3	0.06	0	0	19.68	64.59	40.58	0.56	0.28	0	2.78	7.28	51.14
SEK	46.67	49.41	23.48	0.11	5.48	85.19	87.2	81.67	77.98	54.61	2.29	32.14	32.31	98.83
SGD	31.64	51.19	13.8	0	2.32	87.19	86.25	87.41	75.1	38.21	0.83	15.96	37.77	90.45
THB	34.01	52.73	8.28	0	1.27	42.46	70.96	71.95	31.2	10.22	0.06	20.43	22.58	71.51
TRY	21.43	53.5	9.03	0	2.19	58.65	84.22	71.48	29.79	21.18	0	7.17	6.5	81.52
TWD	38.6	58.09	8.23	0	1.88	62.18	91.28	87.47	56.65	24.24	0.22	29.98	28.33	78.74
USD	0	0	0	0	0	0	0.99	0	0	0	0	0	0	9.94
ZAR	18.11	31.31	2.6	0	0.77	57.81	82.33	64.77	15.13	4.42	0.06	2.6	2.87	79.51
Averages	**21.58**	**33.21**	**8.39**	**0.03**	**2.50**	**49.92**	**68.86**	**58.75**	**32.40**	**17.26**	**0.59**	**14.70**	**14.21**	**69.75**

Appendix B: MarketPsych Index BUZZ

This shows the percentage of Not Available (NA) values for each index/currency pairing. This is the number of times out of a hundred that the system is not able to generate a value from the source data.

As on the previous two pages, data for indices calculated at the country level (for the home country of a currency, or all Eurozone countries for the Euro) are presented below. Here are displayed the following country-level indices: *Monetary policy loose vs. tight, natural disasters, regime change, social inequality, social unrest and unemployment.*

CURRENCY	MONELVT	NATDSST	REGMCHG	SOCINEQ	SOCUNRS	UNEMPLY
AUD	65.16	0	19.88	75.59	0.11	5.36
BRL	74.27	0.88	60.13	74.05	0.17	46.66
CAD	65.1	0	16.79	73.11	0	4.42
CHF	80.4	12.53	75.21	96.63	3.37	56.93
DKK	98.22	39.1	85.9	96.27	8.77	34.66
EGP	97.59	15.08	46.69	92.26	0.34	66.37
EUR	13.31	0	0	35.56	0	0
GBP	11.65	0	0.5	26.01	0	0.77
HKD	81.34	5.58	77.86	83.93	3.31	56.21
IDR	87.79	0.66	69.56	92.21	0.11	62.32
ILS	93.55	0.22	16.59	80.21	0	41.37
INR	51.57	0	0.83	48.15	0	9.77
JPY	25.68	0	22.36	75.37	0	7.68
KRW	85.26	4.2	55.77	84.98	0.33	53.12
MXN	91.77	0.61	19	86.36	0.06	36.5
MYR	87.85	10.77	75.69	94.7	0.99	76.08
NOK	96.52	24.79	86.58	97.66	9.19	30.9
NZD	85.97	3.87	78.63	90.94	1.55	55.27
RUB	82.99	0	2.56	87.05	0	40.74
SEK	92.23	33.87	82.34	92.68	6.82	42.2
SGD	80.56	16.18	86.03	90.34	9.39	73.38
THB	86.09	4.36	35.17	89.01	0.22	80.67
TRY	75.19	9.2	32.91	94.68	0	60.68
TWD	93.04	8.72	80.34	93.59	3.04	42.96
USD	4.2	0	0	6.74	0	0
ZAR	83.6	1.66	34.18	50.86	0	17.06
Averages	**72.73**	**7.40**	**44.67**	**77.27**	**1.84**	**38.54**

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Ian MacGillivray is a Senior Research Engineer in the Thomson Reuters Corporate Research & Development group. His current work includes an entity-centric framework to discover, quantify and qualify relationships and similarities, an effort to find new sources of alpha for the markets, and explorations of social media and behavior. His research background is in probability theory and agent-based systems. He has a keen interest in physics and language, and has a BSc. in Computer Science from Aston University. He was awarded the Thomson Reuters Inventor of the Year award for a patent filed in 2011.

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