

Cross Asset Volatility

Machine Learning Based Trade Recommendations

- This week we introduce a new signal from our recent report ([Relative Value Trading on FX Volatility Surfaces, July 2](#)). This report describes our machine learning model which uses the principal components of the volatility surfaces of FX pairs as signals to trade different parts of the surface. In **Figure 14** below, we show the model's expected **PnL** in basis points when holding a fixed notional in either **25D Puts**, **ATM Straddles**, or **25D Calls** for each of the **3M**, **6M**, **12M** tenors, for each **G10** currency pair. The model uses a holding period of **1 Month**.
- From the signal described in the report from the bullet above (see Figure 14) we recommend **selling USD-NOK 1Y ATM straddles and going long USD-NOK 3M ATM Straddles**. In Figure 14 below there is a large difference between the expected PnL from these two structures. We also show the history of these vol levels in the figure on page 1.
- This week our **1M ATM FX** volatility models are showing that **1M ATM** volatility is underpriced for most of the currency pairs. One big exception is **TWD** which is showing up as extremely rich. We recommend selling **1M ATM** straddles on **TWD** and going long **1M ATM** straddles on **KRW**. Since the **EM** and **G10 VXY** vol levels are back to near the YTD low a long vol lean may be interesting here. In this case, it may be better to choose a longer expiry, perhaps **3M** as the post-summer month expiries may be more suitable for expressing the long vol tilt.

Global Quantitative and Derivatives Strategy

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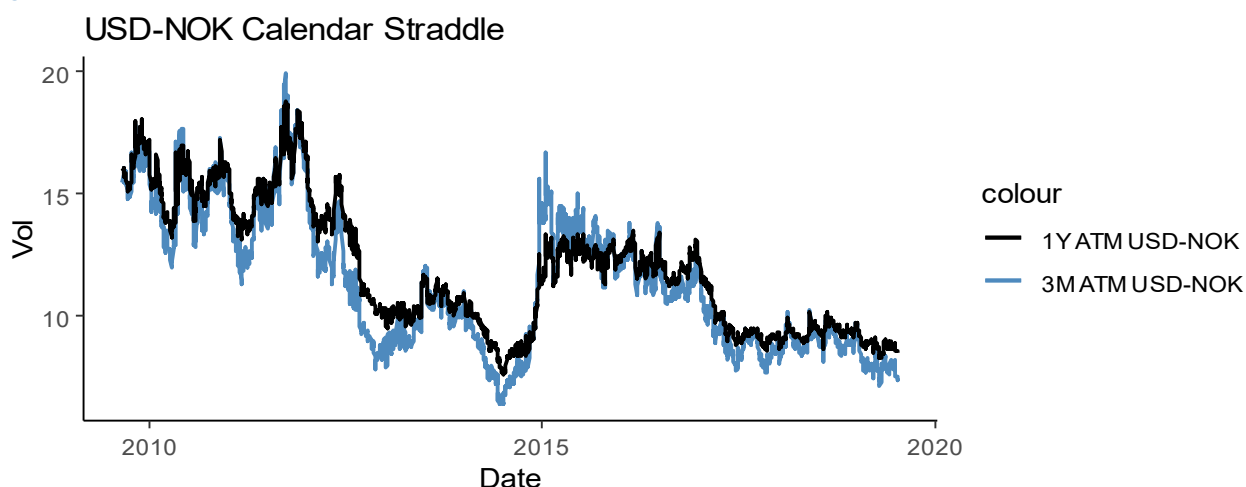
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Figure: USD-NOK Calendar Straddle



Source: J.P. Morgan

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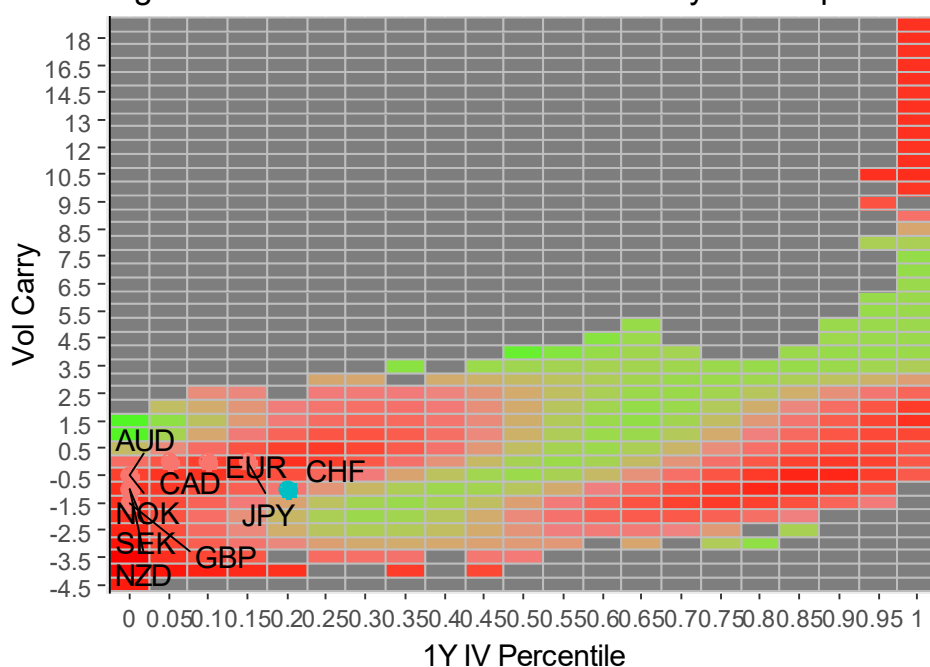
G10 FX 1M Volatility¹

Figure 1: G10 Dollar Pair FX 1M Volatility Ranking 2019-07-05

	Ccy	1M ATM Implied Vol	IV Percentile(1 yr)	Short Vol Carry	Short Vol SVM Predicted Hit Ratio	Direction
1	CHF	5.35	0.25	-0.93	0.60	Rich
2	CAD	5.08	0.07	0.23	0.33	Cheap
3	AUD	6.38	0.01	-0.33	0.18	Cheap
4	NOK	6.98	0.03	-0.35	0.13	Cheap
5	EUR	5.05	0.11	0.07	0.13	Cheap
6	SEK	6.92	0.03	-0.52	0.07	Cheap
7	NZD	7.15	0.04	-0.79	0.05	Cheap
8	GBP	5.55	0.00	-1.28	0.04	Cheap
9	JPY	5.69	0.18	0.01	0.04	Cheap

Source: J.P. Morgan

Figure 2: G10 Dollar Pair FX 1M Volatility Scatterplot



Source: J.P. Morgan

Green Region is Good for Selling Vol. **Red** is Good for Buying.

Direction “Rich” Means We Recommend Selling Vol.

¹ Big Data and AI Strategies: Enhancing FX volatility trading with machine learning, 13 Aug 2018

EM FX 1M Volatility²

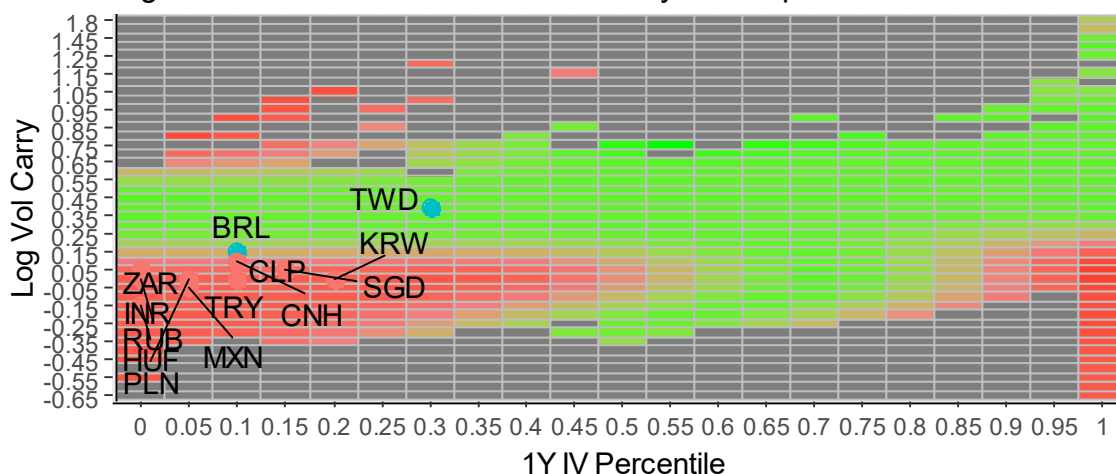
Figure 3: EM Dollar Pair FX 1M Volatility Ranking 2019-07-05

	Ccy	1M ATM Implied Vol	IV Percentile(1 yr)	Log Vol Carry	Carry	Short Vol SVM Predicted Hit Ratio	Direction
1	TWD	4.43	0.35	0.41	1.50	0.94	Rich
2	BRL	13.09	0.12	0.20	2.36	0.77	Rich
3	CNH	4.25	0.11	0.12	0.47	0.41	Cheap
4	SGD	3.43	0.17	0.07	0.24	0.22	Cheap
5	ZAR	13.71	0.02	0.05	0.71	0.16	Cheap
6	CLP	8.83	0.14	0.04	0.34	0.14	Cheap
7	INR	5.01	0.02	0.04	0.19	0.13	Cheap
8	RUB	7.90	0.02	0.03	0.22	0.10	Cheap
9	TRY	15.40	0.10	0.00	0.07	0.09	Cheap
10	PLN	6.32	0.06	0.00	0.01	0.08	Cheap
11	MXN	9.14	0.08	-0.01	-0.06	0.08	Cheap
12	KRW	6.39	0.22	0.02	0.13	0.06	Cheap
13	HUF	6.96	0.04	-0.11	-0.79	0.05	Cheap

Source: J.P. Morgan.

Note: Log Carry = $\text{Log}(IV/EMA)$, Carry = $IV - EMA$ (see original report for details)

Figure 4: EM Dollar Pair FX 1M Volatility Scatterplot



Source: J.P. Morgan

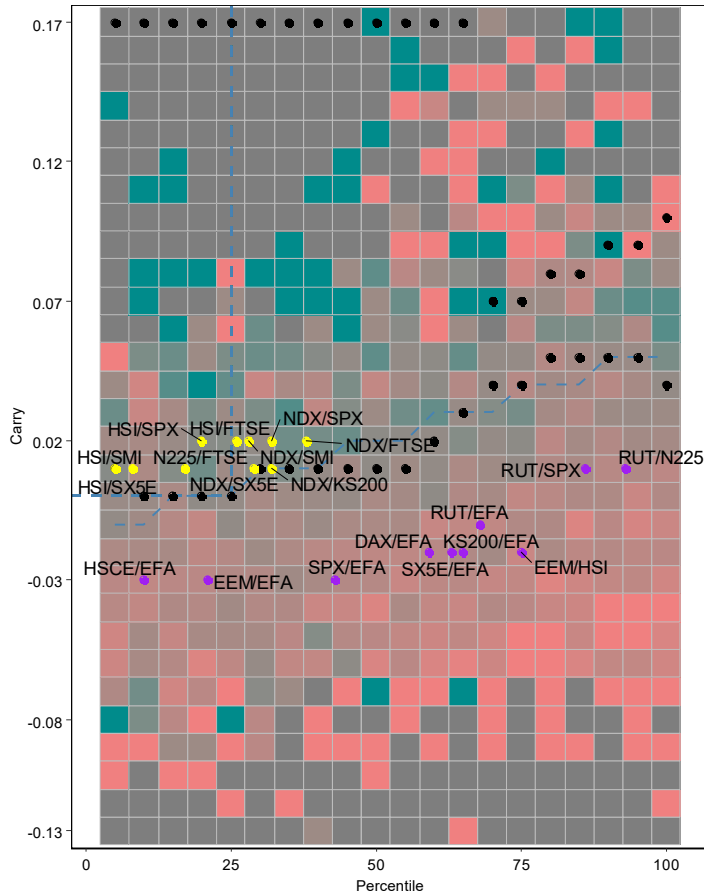
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² Big Data and AI Strategies: Machine Learning to the rescue in cracking the tough EM FX volatility trading cookie, 13 Sep 2018

Equity Index 1Y Variance Swaps Relative Value³

Figure 5: Top 10 Decompression/Compression Variance Pairs 2019-07-05



Source: J.P. Morgan

Figure 6: Top 10 Variance Pairs for Decompression

	Long	Short	Carry	IV Percentile(1 Year)	Predicted Hit Ratio
1	NDX	FTSE	0.02	38	1.00
2	HSI	FTSE	0.02	26	0.99
3	NDX	SPX	0.02	32	0.93
4	HSI	SPX	0.02	20	0.91
5	NDX	SMI	0.02	28	0.91
6	NDX	SX5E	0.01	29	0.89
7	N225	FTSE	0.01	17	0.85
8	HSI	SMI	0.01	8	0.85
9	NDX	KS200	0.01	32	0.82
10	HSI	SX5E	0.01	5	0.80

Source: J.P. Morgan

Figure 7: Top 10 Variance Pairs for Compression

	Long	Short	Carry	IV Percentile(1 Year)	Predicted Hit Ratio
1	EEM	HSI	-0.02	75	0.05
2	RUT	SPX	0.01	86	0.04
3	RUT	N225	0.01	93	0.04
4	SPX	EFA	-0.03	43	0.04
5	RUT	EFA	-0.01	68	0.04
6	SX5E	EFA	-0.02	63	0.04
7	EEM	EFA	-0.03	21	0.04
8	DAX	EFA	-0.02	59	0.04
9	KS200	EFA	-0.02	65	0.04
10	HSCE	EFA	-0.03	10	0.04

Source: J.P. Morgan

³ Global Equity Derivatives: A simple machine learning approach to variance pairs trading, 24 July 2018
Big Data and AI Strategies: Attractive long/short variance pairs in a machine learning framework, 15 Aug 2018
Big Data and AI Strategies: Application of support vector machine to cross-asset volatility pair trading, 02 Oct 2018

ETF Relative Value Volatility Rankings⁴

Figure 8: Broad Based ETF Relative Value Volatility Rankings (Ordered from Cheap to Rich) 2019-07-08

	Name	3M Implied	RV Predicted	EWMA Realised	3M Returns	RV Rank
HEDJ	WISDOMTREE EUROPE HEDGED EQU	12.0	13.1	12.8	3.9	11
EFA	ISHARES MSCI EAFE	10.7	11.4	10.8	2.3	19
QQQ	INVESCO QQQ TRUST SERIES 1	15.5	16.3	16.3	4.1	24
VGK	VANGUARD FTSE EUROPE	11.8	12.4	11.9	2.1	25
ACWI	ISHARES MSCI ACWI	11.0	11.5	10.9	2.8	29
MDY	SPDR S&P MIDCAP 400 TRST	13.0	13.6	13.2	2.0	30
IWF	ISHARES RUSSELL 1000 GROWTH	13.6	14.0	13.8	4.8	32
FEZ	SPDR EURO STOXX 50	13.2	13.4	13.0	4.6	34
IWM	ISHARES RUSSELL 2000	15.0	15.3	15.2	0.8	36
SPY	SPDR S&P 500 TRUST	11.9	12.1	11.6	4.3	37
VTI	VANGUARD TOTAL STOCK MKT	12.2	12.3	11.8	4.1	39
IVV	ISHARES CORE S&P 500	12.0	12.0	11.5	4.3	42
IWD	ISHARES RUSSELL 1000 VALUE E	11.2	11.1	10.5	3.7	51
DIA	SPDR DJIA TRUST	12.1	11.9	11.3	2.6	53
IWO	ISHARES RUSSELL 2000 GROWTH	17.5	17.0	17.2	1.8	56
IWN	ISHARES RUSSELL 2000 VALUE E	15.0	14.3	14.0	-0.2	59
EEM	ISHARES MSCI EMERGING MARKET	16.5	15.6	15.2	-1.8	61
VWO	VANGUARD FTSE EMERGING MARKE	16.5	15.2	14.9	-0.9	65

Source: J.P. Morgan

Figure 9: Sector ETF Relative Value Volatility Rankings (Ordered from Cheap to Rich) 2019-07-08

	Name	3M Implied	RV Predicted	EWMA Realised	3M Returns	RV Rank
XLK	TECHNOLOGY SELECT SECT SPDR	16.0	18.4	17.8	6.0	2
XLC	COMM SERV SELECT SECTOR SPDR	15.7	17.0	16.3	4.8	14
XLE	ENERGY SELECT SECTOR SPDR	17.4	18.6	17.8	-4.3	17
XLB	MATERIALS SELECT SECTOR SPDR	15.1	15.9	15.1	2.4	22
XLU	UTILITIES SELECT SECTOR SPDR	13.1	13.8	12.8	6.1	23
XLP	CONSUMER STAPLES SPDR	11.5	12.0	11.1	7.7	27
SPY	SPDR S&P 500 TRUST	11.9	12.1	11.6	4.3	37
XLF	FINANCIAL SELECT SECTOR SPDR	14.9	15.0	14.1	6.4	40
XLV	HEALTH CARE SELECT SECTOR	13.4	13.2	12.3	3.0	48
XLY	CONSUMER DISCRETIONARY SELT	15.2	14.2	13.3	4.4	64

Source: J.P. Morgan

⁴ Global Equity Derivatives: US ETF relative value volatility model, 27 Mar 2018

Predicted P&L from Selling Gold Vol⁵

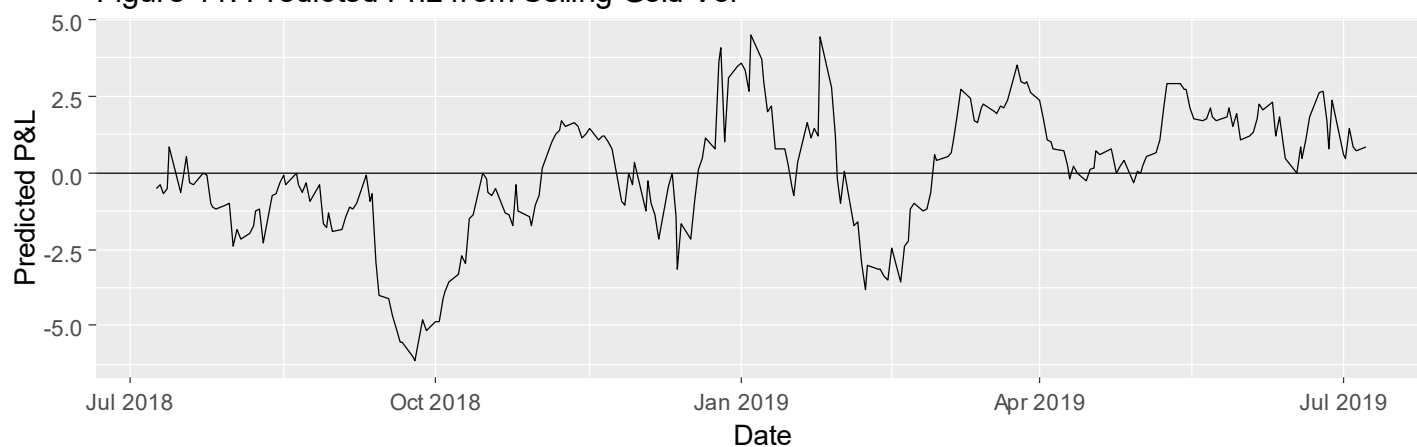
Figure 10: Gold Vol Recommendations

	Last Close Date	Expected P&L from Selling 1M Vol	Recommendation
1	2019-07-02	0.45	Sell
2	2019-07-03	1.44	Sell
3	2019-07-04	0.82	Sell
4	2019-07-05	0.69	Sell
5	2019-07-08	0.85	Sell

Source: J.P. Morgan

*Go long volatility when expected Vol selling P&L is negative

Figure 11: Predicted PnL from Selling Gold Vol

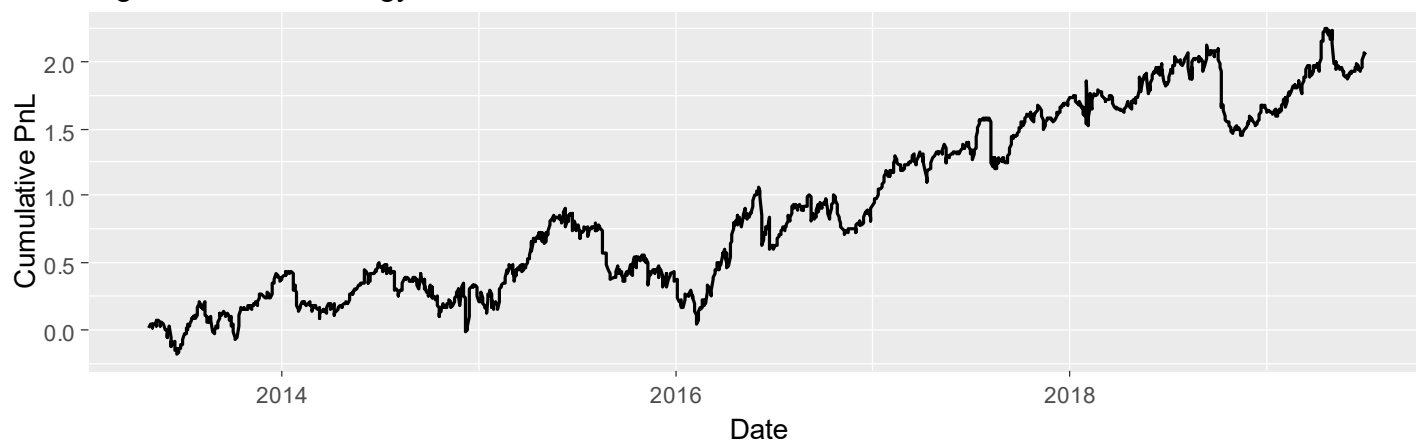


Source: J.P. Morgan

⁵ Big Data and AI Strategies: Machine learning approach to trading gold volatility, 19 Oct 2018

VIX Term Structure Dynamic Allocation⁶

Figure 12: VIX Strategy PnL Curve



Source: J.P. Morgan

Figure 13: VIX Futures Weights Recommendations

	Date	Cont. 1 (Jul)	Cont. 2 (Aug)	Cont. 3 (Sep)	Cont. 4 (Oct)	Cont. 5 (Nov)
1	2019-06-28	-0.4	-0.44	-0.29	0.06	0.07
2	2019-07-01	-0.4	-0.43	-0.29	0.06	0.07
3	2019-07-02	-0.47	-0.42	-0.26	0.07	0.08
4	2019-07-03	-0.48	-0.42	-0.25	0.07	0.08
5	2019-07-05	-0.5	-0.42	-0.26	0.07	0.1

Source: J.P. Morgan

⁶ Big Data and AI Strategies: VIX Term Structure Dynamic Allocation, 08 April 2019

Relative Value Trading on FX Volatility Surfaces

Negative PnL => **Profit** from **Selling** the Options.

Positive PnL => **Profit** from **Buying** the Options.

Figure 14: Vol Surface PnL Predictions in Basis Points 2019-07-04

	ccy	3Mp25	3Ms50	3Mc25	6Mp25	6Ms50	6Mc25	12Mp25	12Ms50	12Mc25
1	AUD-USD	-18	-4	-4	-20	-10	-7	-19	-16	-7
2	USD-CAD	-8	-8	-11	-7	-7	-8	-5	-3	-2
3	USD-CHF	-5	-10	-12	-5	-7	-10	-5	-7	-7
4	EUR-USD	0	4	-1	0	3	0	-4	-1	-2
5	GBP-USD	-22	-19	-13	-18	-16	-11	-14	-14	-10
6	USD-JPY	-19	-20	-22	-19	-19	-19	-19	-22	-21
7	USD-NOK	-30	-38	-27	-41	-58	-42	-45	-69	-51
8	NZD-USD	-41	-35	-18	-40	-40	-22	-38	-38	-18
9	USD-SEK	-3	-9	-18	-5	-15	-20	-13	-28	-29

Source: J.P. Morgan

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