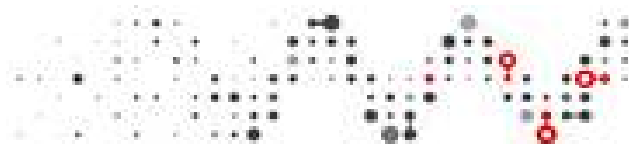# UBS

UBS Webinar Quant Insight Series 2021 - Preserving alpha in currency investing and an FX overlay strategy for Chinese equities

Michael Melvin, University of California San Diego

Moderator: **Fabrice Schloegel,** Head of Quantitative Research, ASIA, UBS

Disclaimer

This presentation was produced solely by Michael Melvin. The opinions and statements expressed herein are those of Michael Melvin are not necessarily the opinions of any other entity, including UBS AG and its affiliates. UBS AG and its affiliates accept no responsibility whatsoever for the accuracy, reliability or completeness of the information, statements or opinions contained in this presentation and will not be liable either directly or indirectly for any consequences, including any loss or damage, arising out of the use of or reliance on this presentation or any part thereof.

Reproduced with permission.

Webinar drawn from two recent papers

- "Preserving Alpha: The Effect of Trade Size and Rebalancing Frequency on FX Strategy Returns" <u>Journal of Financial Markets</u>, November 2020
  - with Wenqiang Pan, Columbia U. and Petra Wikstrom, Streamline Analytix

- "Chinese Exchange Rate Policy: Lessons for Global Investors" <u>Journal of Money, Credit, and Banking</u>, forthcoming
  - with Frank Westermann, University of Osnabrück

Preserving Alpha Motivation

- "You are lucky you are in currencies since you do not have to worry about trading costs"
- "We are too small to worry about transaction costs"

What do investors want?

- "Alpha"
  - Excess return
  - Net return after costs
  - Attractive risk-adjusted returns

- Don't give away alpha by trading too often or too large
  - Consider trade cost impacts
  - Every investment strategy has some optimal capacity
    - How do you know when you are "too big"?

Why worry, just trade algorithmically

- Break up large trades into many small trades
- Many participants do not use algos
- E-trading is more than algos

Trade size ignored in FX literature & often in investment research

- Common to use WM fixing price spreads at 4pm London
  - Average trade prices over 5 minute window on EBS, Currenex, or Thompson-Reuters (Refinitiv)
  - Many small trades done at top of order book
- Some authors have used top of order book prices from EBS or T-R
  - Best bid and ask will have relatively small quantity
  - Larger trades must aggress further down the order book to be filled

- This means that findings in literature and many backtests are fine for small trade size, but not large

Methodology

- Create a generic systematic momentum strategy
- Use actual trade prices to demonstrate the effect of trade size on costs and returns
- Consider alternative portfolio constructions to demonstrate how sensitive results are

- Bottom line: trade strategy & trade size matters a lot

Data

- 18 "trade" currencies
  - EUR, JPY, GBP, CAD, AUD, NZD, SEK, NOK, CHF
  - CNH, SGD, MXN, CZK, TRY, PLN, HUF, ILS, ZAR
- Daily price from WM 4pm London fix
- Bid-ask spreads from EBS or T-R
  - Have entire order book
  - "sweep-to-fill" costs
  - Daily average over liquid trading hours
  - $1, 10, and 25 million trade size

Table 1: Annualized Volatility and Transaction Costs of G10 Currencies

Transaction costs are measured by half spreads in basis points for trades of $1, 10, and 25 million from spot prices on the EBS or Reuters FX electronic brokerages by "sweep to fill" aggregation down the order book. Values for realized volatility and spreads are sample averages. Volume data are billions of USD from the BIS Triennial Survey and include spot and forward dated transactions against the USD. Spreads are in basis points.

| Currency	EUR	JPY	GBP	CAD	CHF	AUD	NZD	SEK	NOK
Volatility	8.60%	10.20%	9.40%	7.90%	10.50%	10.00%	11.10%	6.30%	8.40%
Volume	$1,172b	$901b	$470b	$218b	$180b	$262b	$78b	$66b	$48b
1mn	0.47	0.53	0.9	0.96	1.07	1.09	1.62	2.14	2.81
10mn	0.8	0.98	1.49	1.76	2.2	1.99	3.41	4.32	6
25mn	1.29	1.68	2.51	3.1	4.24	3.52	6.41	8.53	12.31
25/1	2.7	3.2	2.8	3.2	4.0	3.2	4.0	4.0	4.4

Table 2: Annualized Volatility and Transaction Costs of Emerging Market Currencies
Transaction costs are measured by half spreads in basis points for trades of $1, 10, and 25 million from spot prices on the EBS or Reuters FX electronic brokerages by "sweep to fill" aggregation down the order book. Values for volatility and spreads are sample averages. Volume data are billions of USD from the BIS Triennial Survey and include spot and forward dated transactions against the USD. Spreads are in basis points

Currency	CNH	SGD	MXN	CZK	TRY	PLN	HUF	ZAR	ILS
Volatility	3.6%	5.4%	11.6%	3.6%	11.4%	5.8%	6.2%	15.7%	6.6%
Volume	$67b	$81b	$90b	$18b	$64b	$19b	$5b	$40b	$7b
1mn	0.43	0.99	2.30	2.50	3.14	3.80	4.29	4.92	6.02
10mn	0.95	2.22	5.20	5.19	6.90	7.32	7.90	10.38	12.85
25mn	1.94	4.58	10.53	10.26	14.22	13.96	14.80	21.55	26.66
25/1	4.5	4.6	4.6	4.1	4.5	3.7	3.5	4.4	4.4

Figure 1: Spread, Volume, and Volatility for Emerging Market Currencies
Bid-ask spreads are plotted against average daily volume. The size of the bubble represents volatility.

Spread, Volume, and Volatility
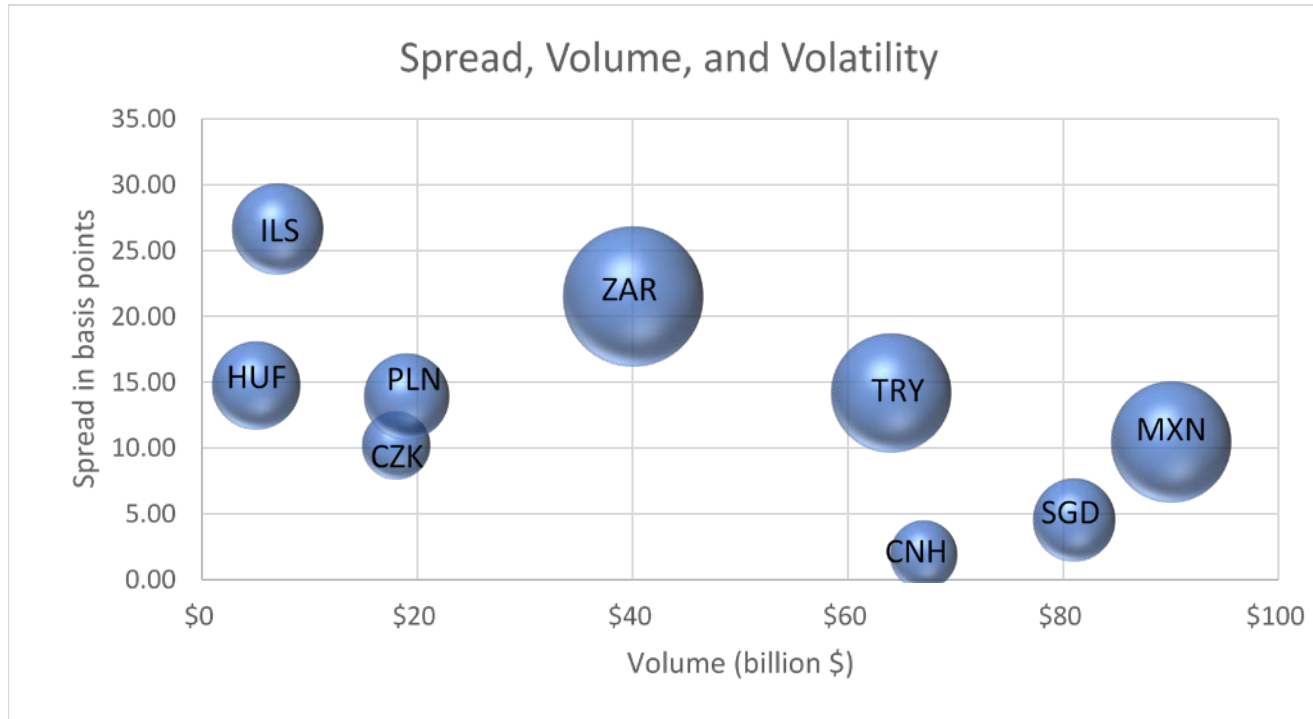
Simple generic momentum strategy

- Calculate recent returns and rank currencies
  - Long top-3
  - Short bottom-3
  - Equal weights
- But what window of time to use?
  - Results sensitive to length of look-back period
- Conduct sensitivity analysis
  - 1-day to 259-days look-back

$$\forall i \in \{1, ..., 259\}, Mom_{t,i} = \left(P_{t-1} \,/\, P_{t-1-i} \right) - 1$$

Figure 3: Total Transaction Costs with Respect to Different Construction History Length
Backtest portfolio simulations are constructed for momentum strategies ranging from historical returns of one day to one year and associated transaction costs are plotted for portfolios with maximum trade sizes of $1, 10, and 25 million. Total costs, measured as (total costs/total portfolio size) in percent over the sample period are plotted for each strategy.
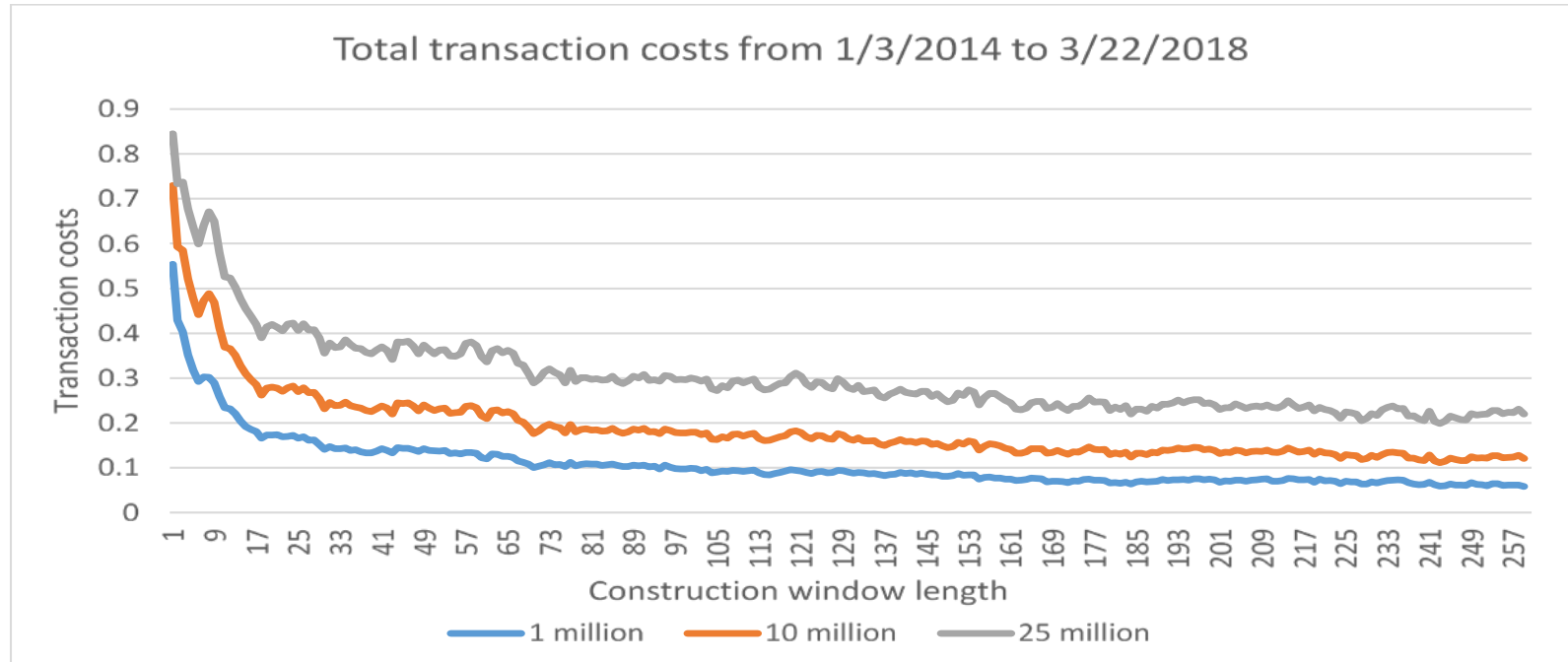

Total transaction costs from 1/3/2014 to 3/22/2018

Figure 2: Total Return with Respect to Different Construction History Length
Backtest portfolio simulations for momentum strategies ranging from historical returns of one day to one year and associated transaction costs are plotted for portfolios with trade sizes of $1, 10, and 25 million maximum size.

Total net return from 1/3/2014 to 3/22/2018
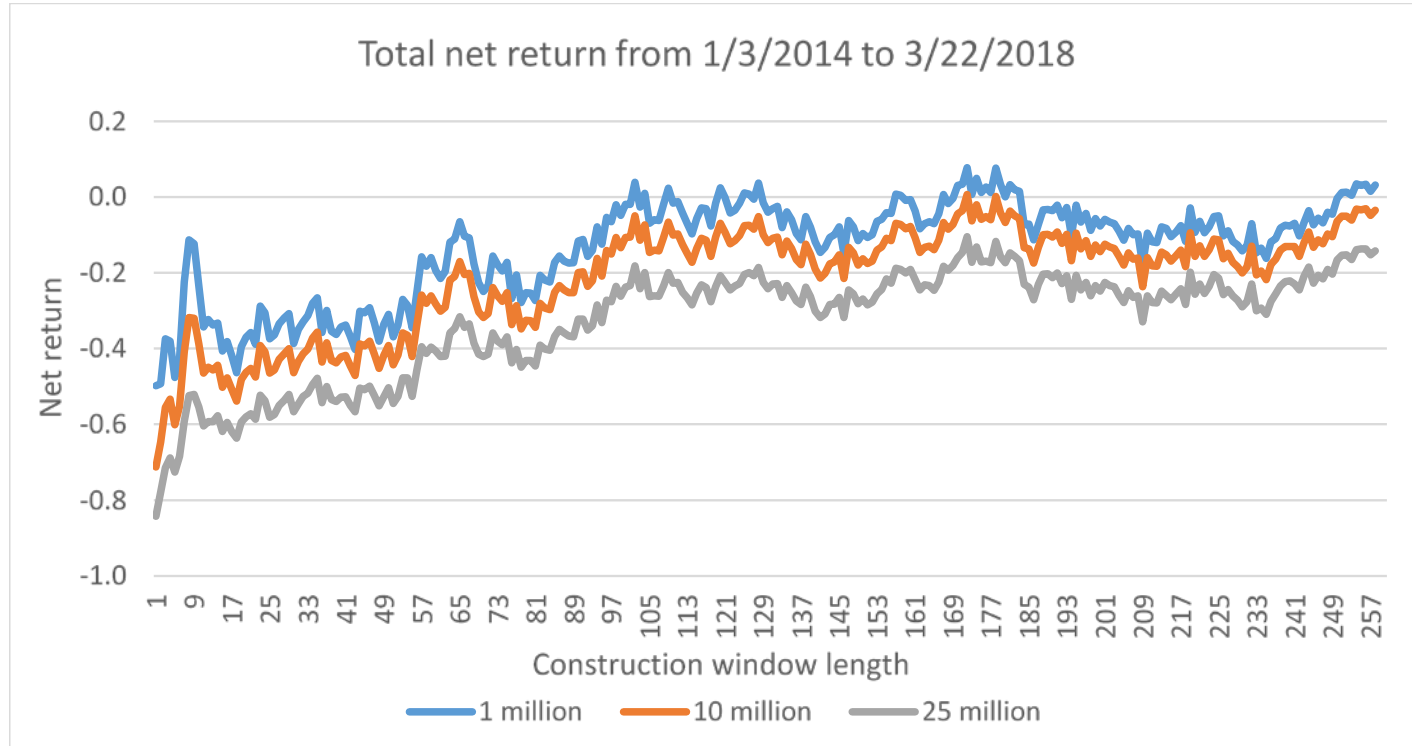
In conclusion…

- The common use of bid-ask spreads from the top of the order book is misleading for all but small trade sizes
- A simple generic momentum strategy with zero tcost pre-trade consideration generally yields negative returns over the sample period
  - The zero-cost portfolio trades too much
  - Including a penalty for tcosts improves performance
  - The tcost penalty can be too high and reduce performance by removing high-cost currencies so that their performance potential is lost
- Even with the tcost penalty, the larger the portfolio, the lower the performance
  - "large trades, small alpha" is an important caution
- Too short a look-back period for calculating momentum returns results in too-fast a trading strategy for daily rebalances with high turnover and costs
  - Our sample had the past 6-months of returns yield the best performance

Chinese Equity Overlay Strategy

- Chinese policy changes: risks and opportunities for global investors
  - The surprise devaluations of the RMB on 11 August 2015 and 6 January 2016

TABLE 1 Cross-market effects of RMB devaluations

	1 week after (%)	1 month after (%)
11 August 2015		
US SPX	−0.3	−7
China SHCOMP	−5	−21
German DAX	−6	−14
6 January 2016		
US SPX	−6	−7
China SHCOMP	−11	−17
German DAX	−3	−10

Chinese Equity Overlay Strategy

- PBOC August 11, 2015 Reform: RMB central parity determined each morning.
  - The previous day's closing rate,
  - market demand and supply, and valuations of other currencies
- Policy suggests an investment strategy for CNH
  - Forecast CNH each day from parity rate announced prior to market opening
    - $d \log C_t = \alpha + \beta d \log P_t$
  - The effect depends upon volatility, as authorities manage the CNH in volatile market
    - $d \log C_t = \alpha + \beta_1 d \log P_t + \beta_2 d \log P_t \times \log IV_{t-1}$

Hedging long Shanghai A-shares equity index

- Priced in CNY, but international investor hedging in offshore CNH
- Forecast direction of change (DC)
  - Hedge (short CNH) when depreciation forecasted
  - No hedge when appreciation forecasted
- Forecast large direction of change (DCL)
  - Hedge when depreciation forecasted is > 1σ of *dlogCNH*
- Active long/short currency overlay based upon forecast direction

Forecast methodology

- Sample period: 8/15-6/19
  - Data followed different process in earlier periods
  - Use earlier data (1/11-8/15) to train model and then update daily to forecast 1-day ahead out-of-sample
- C_t forecast based on:
  - Central parity rate; IV of CNH; A-share premium over H-shares, and lagged C_t
 - Forecast direction of change with 66% accuracy

Trading Strategies

- First, always short CNH at every date to passively hedge the long CNH position inherent in being long A-shares.

- Second, dynamically hedge CNH exposure as guided by the DC indicator.

- Third, dynamically hedge CNH exposure as guided by the DCL indicator.

- Fourth, invest in a long-short dynamic currency overlay strategy as guided by the DC indicator.

- Fifth, invest in a long-short dynamic currency overlay strategy as guided by the DCL indicator.

A-shares index performance: challenging period
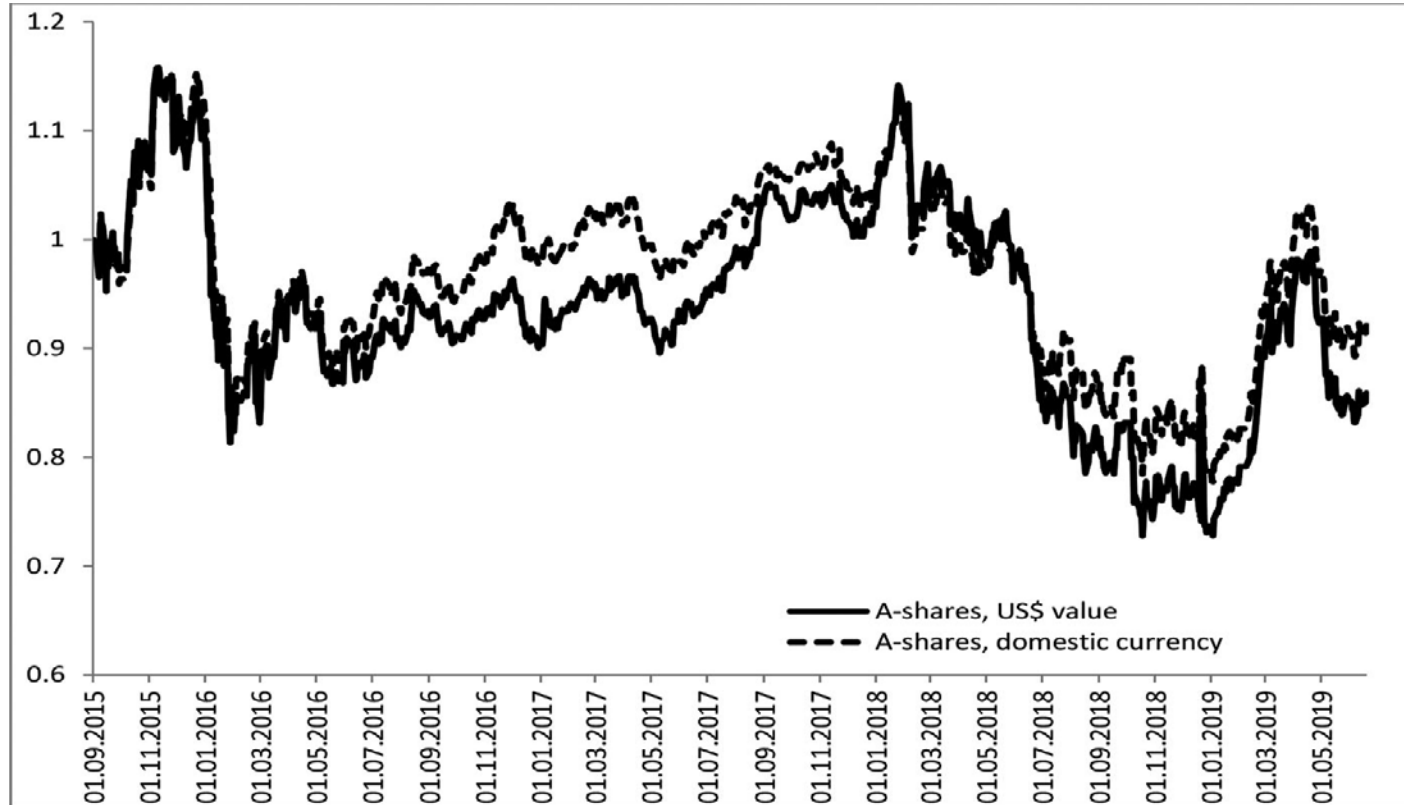
Performance of different currency strategies
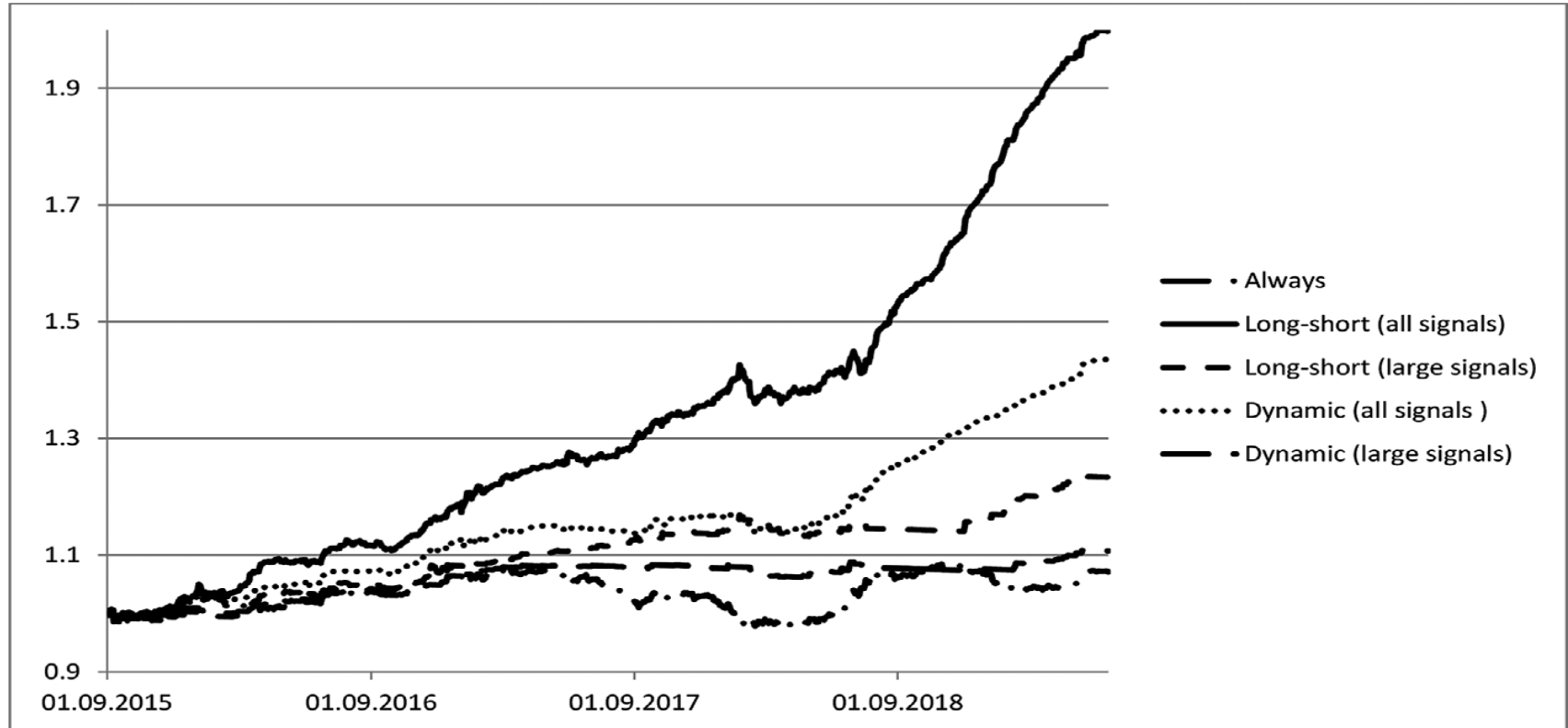
Tcosts matter

- Use Melvin, Pan, Wikstrom 0.43bps for CNH
- Alternatively calculate max tcost for which best performing strategy is still profitable = 12.1bps
  - Large margin for tcosts for which strategies add value

Post-cost returns

RETURNS AFTER ADJUSTING FOR COST

	After cost return	Annualized return	Annualized SD	Information ratio
Equity component	−14.1	−4.8	16.6	−0.29
Currency component				
(A) Always	7.1	1.9	4.1	0.46
(B) Dynamic (large signals)	10.6	2.7	1.7	1.56
(C) Dynamic (all signals)	43.4	10.6	3.1	3.47
(D) Long–short (large signals)	23.3	6.1	2.4	2.58
(E) Long–short (all signals)	99.9	26.1	4.0	6.50
Combined, average return:				
Strategy 1: 50% equity + 50% always hedge	−5.0	−1.3	9.3	−0.14
Strategy 2: 50% Equity + 50% large signals (dynamic)	−3.3	−0.9	10.0	−0.09
Strategy 3: 50% Equity + 50% all signals (dynamic)	13.1	3.4	8.9	0.38
Strategy 4: 50% Equity + 50% large signals (long–short)	3	0.8	10.0	0.08
Strategy 5: 50% Equity + 50% all signals (long–short)	41.21	10.76	9.0	1.20

NOTE: Costs are 0.43 basis points per trade. In Strategy 5, they amount to 5.8% cumulatively, or 1.5% annually.

Summary

- the central parity rate that is announced prior to the market opening in China will influence trading and will cause the CNH exchange rate to adjust toward the new parity rate each day

- this link between CNH and the parity rate will be weakened in times of high volatility when the PBOC aims policy at moderating volatility

- We can predict the daily direction of change with 66% accuracy

- All currency portfolios added value to the equity portfolio. The best performing currency strategy was the long–short active strategy using forecasts for all days

- when Chinese equities did not perform well, the inclusion of an active currency overlay would have added much value for a USD-based investor

The Western Border of UCSD: