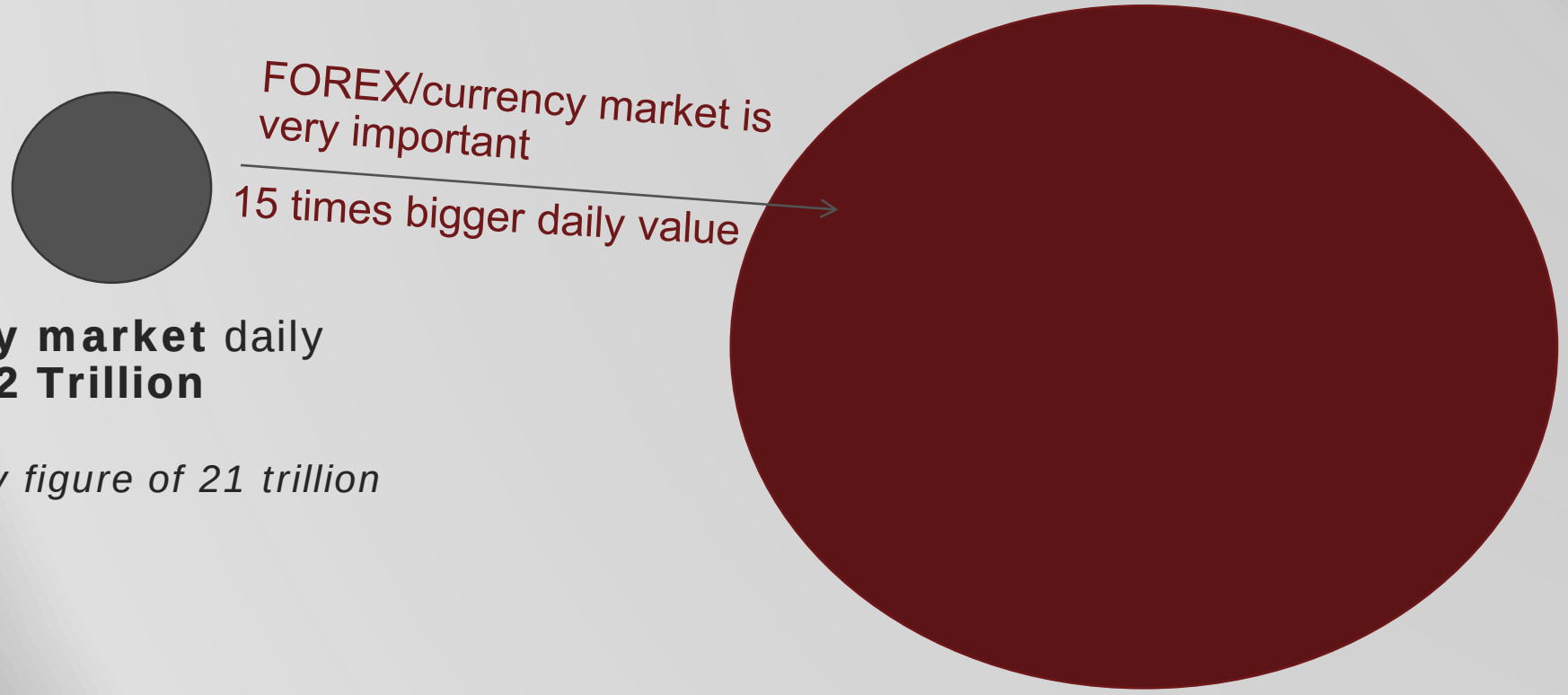
2018 ASIAN BUREAU OF FINANCE AND ECONOMIC RESEARCH (ABFER)

CARRY TRADES AND GLOBAL RISK

GEORGE PANAYOTOV

DISCUSSION BY ZSUZSA R. HUSZÁR

IMPORTANCE OF FOREX AND CURRENCY RESEARCH !!!



Global **Equity market** daily trad. Vol **$0.2 Trillion**

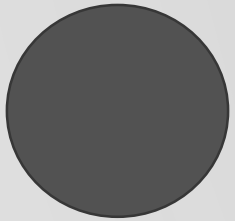
From Quarterly figure of 21 trillion

Daily Forex trading volume is **$3 Trillion**

Most top finance papers focus on equity market, specifically US equities (Karolyi, 2016)

Less than 16% of top papers deal with international topics (Karolyi, 2016)

IMPORTANCE OF FOREX AND CURRENCY RESEARCH !!!



US equity market fairly efficient

Anomalies short lived, mispricing get arbitraged away

Evident mispricing, or persistent “puzzle “ with carry trades

Most top finance papers focus on equity market, specifically US equities (Karolyi, 2016)

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IMPORTANCE OF FOREX AND CURRENCY RESEARCH !!!

- The topic of FOREX and carry trades is important, the author is working on an important topic.
  - In recent years with globalization more and more MNCs are also jumping on the bandwagon of carry trade.

APPLE Bond issue in 2015 (USDCHF=0.97 in Febr, 2017)

- 10 year maturity bond with 0.28% yield (comparable US treasury yield was1.92%)

- 15 year maturity bond with 0.74% yield (comparable US treasury rate was 2.3-2.5%)

Corporate financing is beyond the scope of this paper: But, it would be interesting to examine these cross country corporate fund movements (most forex studies, as this paper only concerns with the cross country bank lending).

CARRY TRADES: PROFITS & THEORY

- In parity condition, relative forward rate $(f_t - s_t) \approx i_{foreign} - i_{domestic}$ captures that currency with high interest rate expected to depreciate

  If parity conditions (UIP) do not hold, excess return arise: $rx_{t \to t+k} = f_{t+k} - s_t - \Delta s_{t+k}$ (simply $f_{t+k} - s_{t+k}$) exploitable: by buying currency in forward market and selling it at the spot a month from now

  - The parity condition has been called into question by "countless" empirical evidence (e.g., Fama, 1984; Lewis, 1995; Engel, 1996; Huszar, Tan, Zhang, 2016). But may hold for some emerging countries, like for Russia from 2001 to 2014 (Vasileyev, Busqin, and Busyain, 2017), this difference of emerging and developed countries may warrant more attention but beyond this paper which concerns only with developed countries (why?).
  - Most studies focus on bilateral currency relations, while Lustig and Verdelhan (2007) and Lustig, Roussanov and Verdelhan use a portfolio approach to sort currencies based on cross-sectional interest rate differences (based on all currencies from Datastream) based on 39 currencies.

OBJECTIVE AND CONTRIBUTION

Objective 1: Extend Lustig, Roussanov and Verdelhan (2014JFE) framework, into USD invariant carry trades.

Objective 2: Identify global risk factor(s) in the currency market, sort of running a horse race among 21 candidate factors from the literature, such as :

- Bond market risk factor, Equity Market Risk, VIX, Financial Uncertainty Measures, Global Uncertainty index (Ozturk and Sheng, 2016); OECD industrial production gorwth, OECDsales growth, OECD unemployment change, Economic Policy uncertainty measure (Baker-Bloom-Davis MPU index)
- ***Global Financial Cycle Risk*** (Rey, 2015; Miranda-Agrippino and Ray, 2017)
- Lustig, Roussanov, and Verdelhan (2014)'s DOL.
  - *LRV introduce DOL (dollar carry trade) that short the USD when US interest rates low (in recession) and long when US rates are high (in expansions), LRV show that the DOL time variation captures aggregate risk that investors take on by shorting USD in bad times.*

Note 1: For such an ambitious paper (to identify new global risk factors), the sample may need to be extended to developing countries as well.

CONTRIBUTION BEYOND LRV

The authors modify LRV's model and provide economic intuition into the relation between the dollar factor and the global carry trade returns (eqs. 9, 10, and 11):

$$
\begin{aligned}
DOL_{t+1} &= \frac{\kappa}{2}(z_t - \overline{z_t^i}) + \left(\sqrt{\delta} - \overline{\sqrt{\delta_t^i}}\right)\sqrt{z_t^w}u_{t+1}^w + \sqrt{\kappa}\left(\sqrt{z_t} - \overline{\sqrt{z_t^i}}\right)u_{t+1}^g \\
rx_{t+1}^{carry} &= -\frac{\widetilde{\delta_t^i}}{2}z_t^w - \frac{\kappa}{2}\widetilde{z_t^i} - \widetilde{\sqrt{\delta_t^i}}\sqrt{z_t^w}u_{t+1}^w - \sqrt{\kappa}\widetilde{\sqrt{z_t^i}}u_{t+1}^g.
\end{aligned}
$$

$$
\begin{aligned}
COV^{rx^{carry},DOL} &= -\frac{\kappa^2}{4}E[(z_t - \overline{z_t^i})\widetilde{z_t^i}] - E\left[\left(\sqrt{\delta} - \overline{\sqrt{\delta_t^i}}\right)\widetilde{\sqrt{\delta_t^i}}z_t^w\right] - \kappa E\left[\left(\sqrt{z_t} - \overline{\sqrt{z_t^i}}\right)\widetilde{\sqrt{z_t^i}}\right] \\
&\approx -\frac{\kappa^2 N}{4(N-1)}E[z_t\widetilde{z_t^i}] - E\left[\left(\sqrt{\delta} - \overline{\sqrt{\delta_t^i}}\right)\widetilde{\sqrt{\delta_t^i}}\right]\theta^w - \frac{\kappa N}{N-1}E\left[\sqrt{z_t}\widetilde{\sqrt{z_t^i}}\right],
\end{aligned}
$$

CONTRIBUTION BEYOND LRV

Show the DOL successfully play the role of f_1 and can be combined successfully with a number of previously identified factors (Tables 4-6). In this setting the DOL should not be a valid factor since its explanatory power for the invariant carry is obtained mechanically in the modified LRV

$$rx_{t+1}^{carry,i} = \alpha^i + \xi_1^i f_{t+1}^1 + \beta_2^i f_{t+1}^2 + \xi_2^i f_{t+1}^1 AFD_t>0 + \varepsilon_{t+1}^i$$

Lets zoom on the interaction term, conditioning variable, the key takeaway from the paper

f^1	f^2	α	sig.	ξ_1	sig.	β_2	sig.	ξ_2	sig.	R^2
DOL	BGHY	0.77	(5)	-0.21	(39)	0.08	(42)	0.49	(45)	32.0
DOL	IP	1.06	(7)	-0.19	(35)	0.17	(18)	0.41	(45)	16.2
DOL	SAL	1.27	(15)	-0.19	(35)	0.04	(0)	0.42	(45)	15.6
DOL	BDI	1.30	(15)	-0.20	(35)	0.02	(0)	0.42	(45)	15.5
DOL	VIX	1.84	(40)	-0.19	(34)	-0.01	(45)	0.39	(45)	22.8
DOL	FINU	1.42	(25)	-0.20	(33)	-0.06	(40)	0.41	(45)	18.3
DOL	GPR	1.31	(16)	-0.19	(35)	0.00	(0)	0.42	(45)	15.6
DOL	MPU 1	1.78	(38)	-0.18	(32)	-0.04	(42)	0.41	(45)	18.5

CONTRIBUTION BEYOND LRV

LRV's average forward discount (AFD) on foreign currencies against the USD

$$\overline{f}^{j}_{t\to t+k} - \overline{s}^{j}_{t} = {}^{1}\Big/_{N_t^j} \sum_{i=1}^{N_t^j} f^{i}_{t\to t+k} - s^{i}_{t}$$

is used then as a conditioning variable.

Note 2: Including the formula could be useful for the definition as in the LRV paper

☺

	data			LRV model		
	full	$AFD<0$	$AFD>0$	full	$AFD<0$	$AFD>0$
SC	2.38	0.90	1.49	2.70	1.30	1.40
Static I	1.80	0.44	1.13	1.87	0.89	0.97
Dyna. I	0.58	0.45	0.36	0.83	0.41	0.42

	full				$AFD<0$				$AFD>0$			
no. trades	corr	β_{5th}	β_{95th}	sign.	corr	β_{5th}	β_{95th}	sign.	corr	β_{5th}	β_{95th}	sign.
45	0.75	0.07	0.24	(45)	0.05	-0.28	-0.11	(38)	0.73	0.15	0.33	(45)
10	0.80	0.10	0.22	(10)	0.12	-0.27	-0.13	(10)	0.75	0.17	0.33	(10)
120	0.66	0.03	0.25	(105)	-0.07	-0.30	-0.06	(90)	0.69	0.10	0.35	(120)

CONTRIBUTION BEYOND LRV – A TAKEAWAY (OF THE MANY)

The main contribution: The AFD regimes play an important role in carry trade returns.

(And that Global Financial Cycle Factor (GFC) of Miranda-Agrippino and Ray (2017), which captures the key role of USD for global liquidity and credit conditions, can drive out DOL and MSCI factor).

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(sample period 1984 -2016)

AFD>0, relative low US interest rate (drives carry profits)

- Lower output growth , growing unemployment
- Decreasing financial and global uncertainty
- Stagnant/contracting cross boarder bank lending
- ***dollar carry trade typically short dollar during and after recession, when US rates are low***

STATIC component of carry drives profits (when AFD>0)

- Static component is defined as the contribution by NZD, AUD, NOK (with high forward differentials of 4.3, 3.1 and 2.1% and CHF and JPY (with low forward differentials -1.5% and -2.4%).

- Is the market really that inefficient ?

- FOREX market has daily Turnover of $3 Trillion

As a final point the author show that the global financial cycle factor drives out the dollar factor and the MSCI factor, and "has some pricing ability for the carry cross section" p. 33.

COMMENTS AND SUGGESTIONS (friendly CRITICISMS)

The main results that the static component drives the profitability of carry trades suggest that the market is inefficient (or some costs/risk) have not been addressed, such as

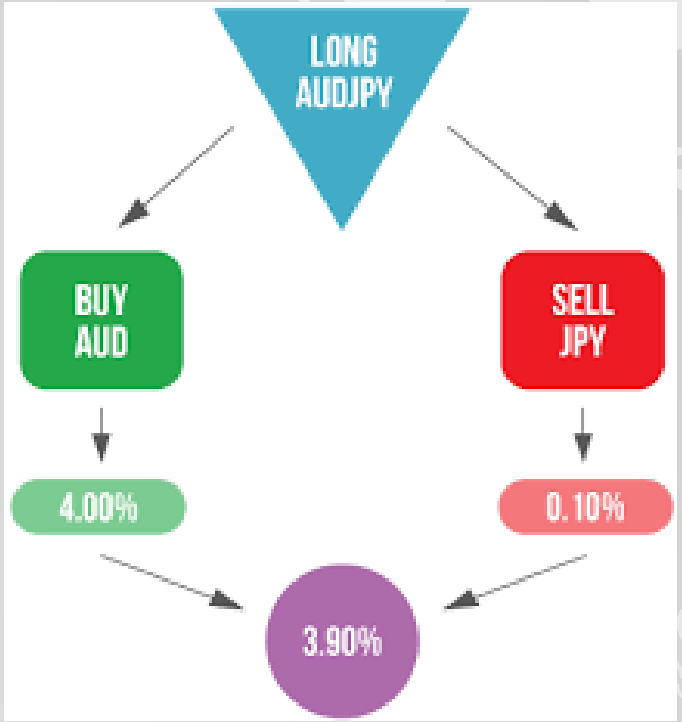
1) Transaction costs – bid-ask spread, margin financing costs, feasibility of the trade, access to borrowing, foreign depositing issues are largely ignored (e.g., The new NZ government prohibits foreign citizens account openings).
   - Bid-ask quotes are ignored because according to one study by Lyons (2001) bid-ask quotes overestimate transaction costs. However, the literature and the base study, LRV use bid-ask spreads.
2) Crash risk and political risk discussion with the AFD factor could link the paper perhaps better with the literature.
   - Will be elaborated in details
3) The major concern – regarding the persistence of the profitability
   - Will be elaborated in details

CARRY TRADES: SIMPLIFIED OVERVIEW

Implementation of Carry trades: An “all time” favourite pair, Aussie dollar and Japanese Yen
WHAT to do? ***Borrow in Japan*** and ***invest in Australia***, pocket the interest rate differentials.

Australia

Rates high
Int. Rate = 4%



Japan

Rates low
Int. Rate = 0.1%

The risk is that Japanese yen appreciates suddenly (or Aussie dollar depreciates)

CARRY TRADES: CRASH RISK

Crash risks (Brunnermeier et al. 2008; Jurek, 2014; Farhi, Freiberger, Gabaix, Verdelhan, 2015)

1. Example: Yen-Aussie carry trade (Nov. 8, 2007)
   - **Borrow** at 0.87% 3m JPY LIBOR ("funding currency")
   - **Invest** at 7.09% 3m AUD LIBOR ("investment currency")
   - **Hope** that JPY doesn't appreciate much

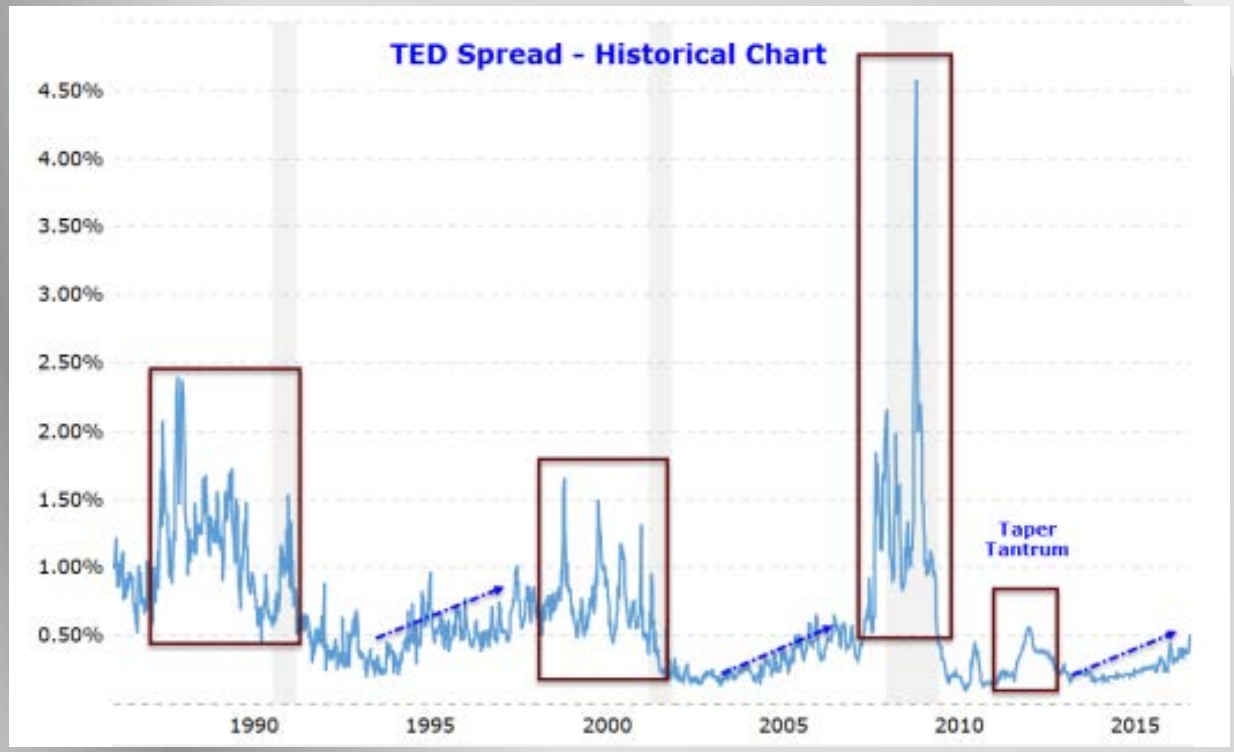
   Violation of UIP - "Forward Premium Puzzle"

2. Large exchange rate movements without news
   Example: October 7th/8th, 1998

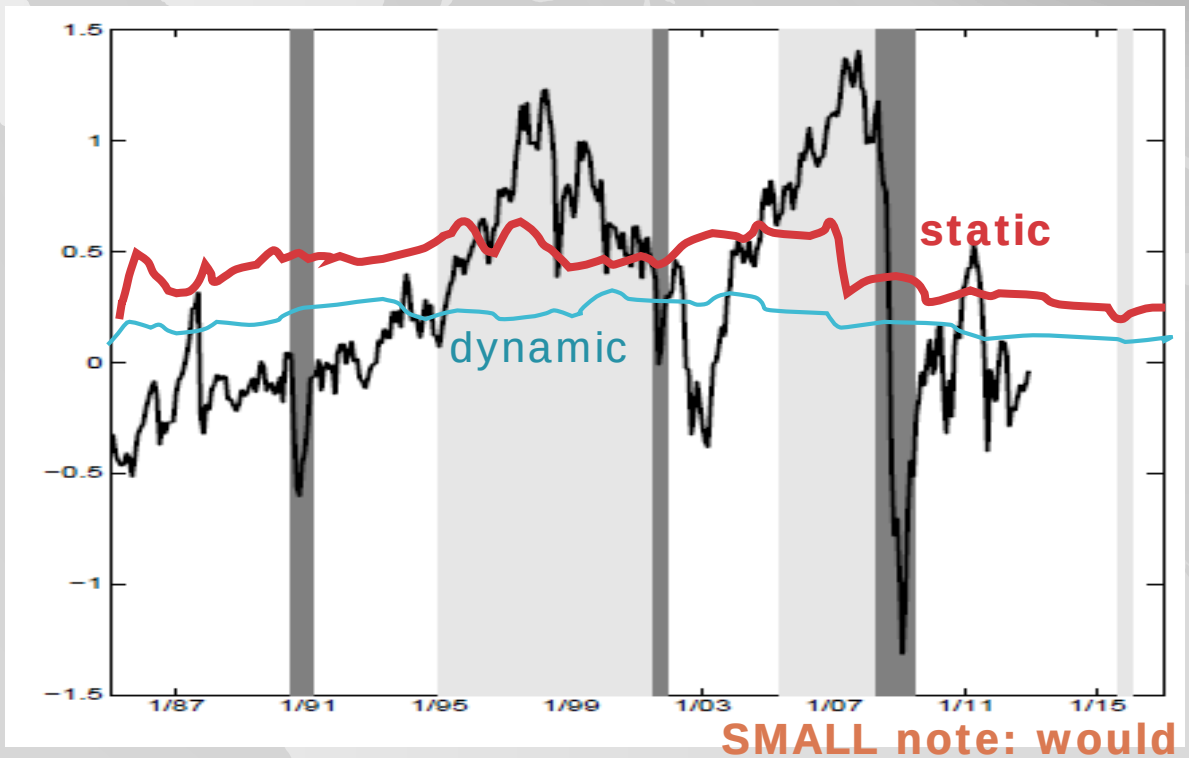
Source: Brunnermeier, Nagel, and Pedersen, 2008

CARRY TRADES: CRASH RISK - LINK

Various other FOREX studies use also Tedspread as proxy for funding liquidity and market liquidity



Tedspread



Global Financial Cycle factor (line)
NBER recession (dark shaded areas)
AFD>0 - lightly shaded areas

SMALL note: would be good to actually spell out exact dates for neg / pos AFD periods

CARRY TRADES: PERSISTENCE

- In mid-June 2014, the benchmark LIBOR interest rates regarding the top currencies for forex trading were:

U.S. (USD) 0.54%
Australia (AUD) 3.35%
New Zealand (NZD) 3.33%
Switzerland(CHF) 0.18%
Japan (JPY) 0.33%
Eurozone (EUR) 0.46%
Canada (CAD) 1.78%
U.K. (GBP) 1.03%

In this paper:
NZD forward differential : 4.3%
AUD forward differential : 3.1%
NOK forward differential : 2.1%

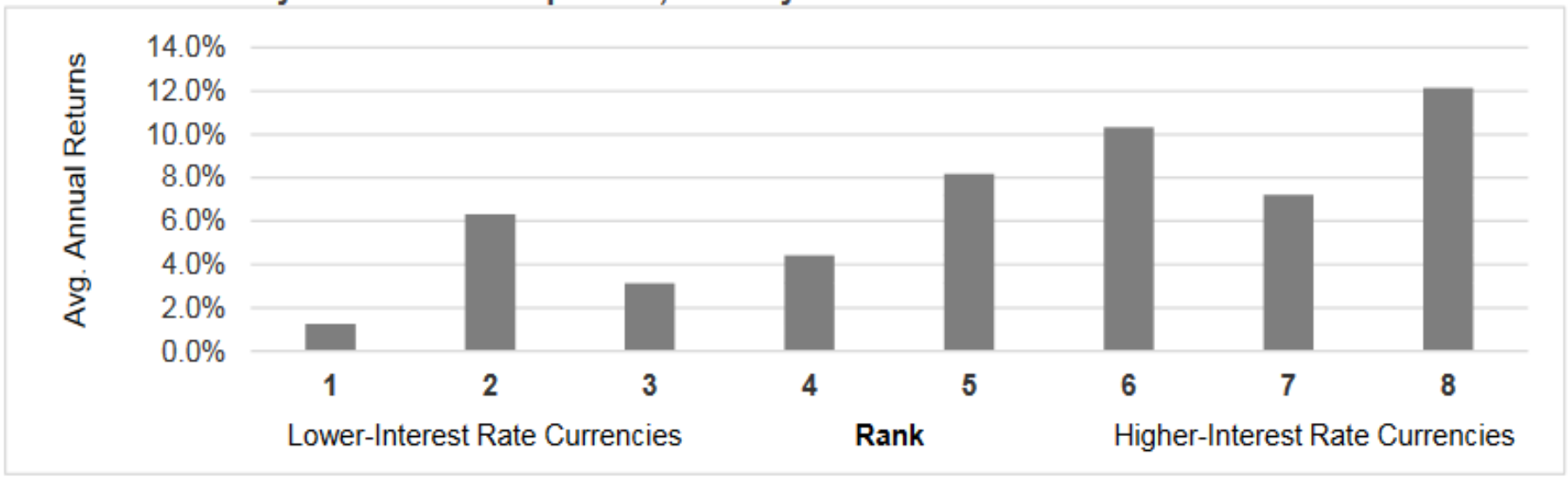
CHF forward differential : - 1.5%
JPY forward differential : - 2.4%

- Since Australia and New Zealand ***usually have the highest yields*** while Japan and Switzerland have the lowest yields, they often provide good trading opportunities. Under the current circumstances, a likely forex carry trade is to buy AUD/JPY or NZD/JPY.

This STATIC strategy in this paper, which drives the carry trade profits

CARRY TRADES PROFITS - EXPLAINED

Exhibit 1: Currency Total Return Disparities, January 1987 – December 2007



Source: Brandes Institute, based on data from FactSet, Global Financial Data, U.S. Economic Research Service, and the International Monetary Fund, as of December 31, 2007. Past performance is no guarantee of future results.

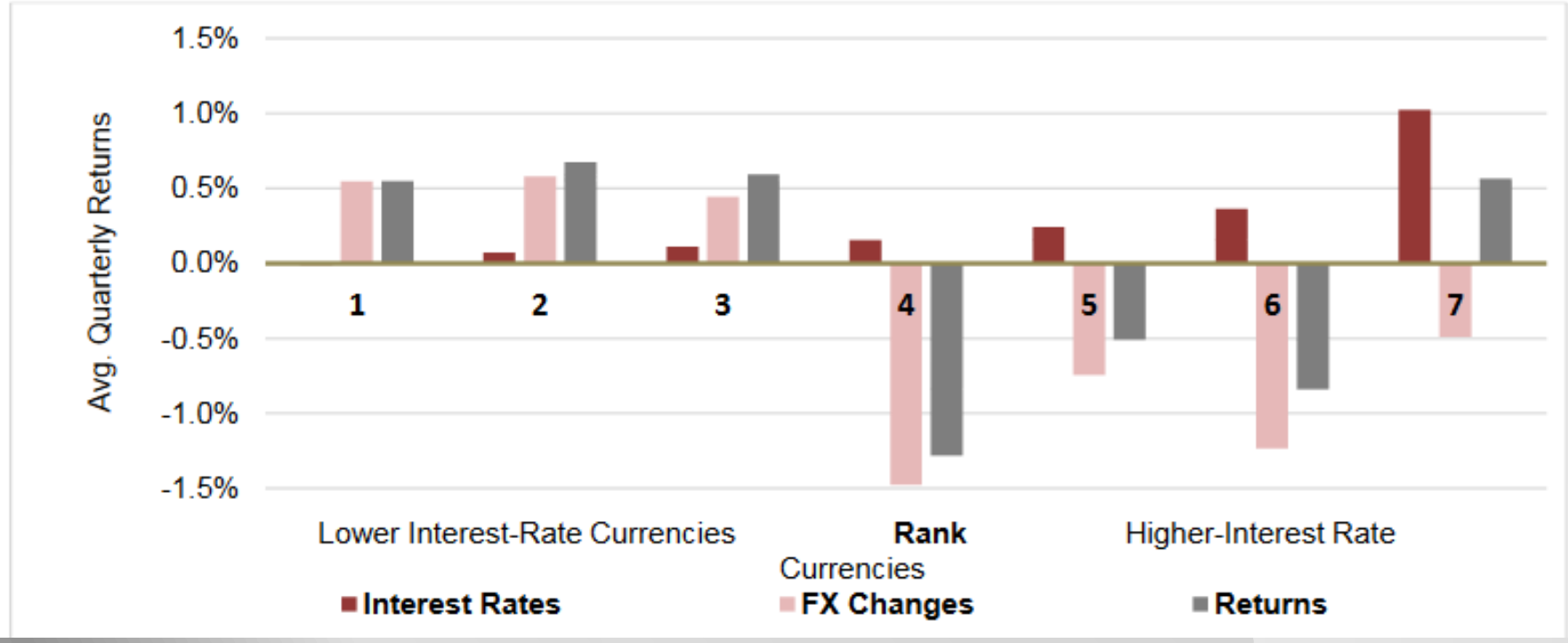
Return in Rank 1: E.g., Japan, is the 3-month short term rate + change in value of JPY against the USD

Source: https://www.brandes.com/docs/default-source/brandes-institute/2017/currency-carry-trade

CARRY TRADES: EXPLAINED AWAY

Exhibit 2: Currency Carry Trade Failed to Deliver Consistent Results

Average Quarterly Returns, January 2008 – June 2016

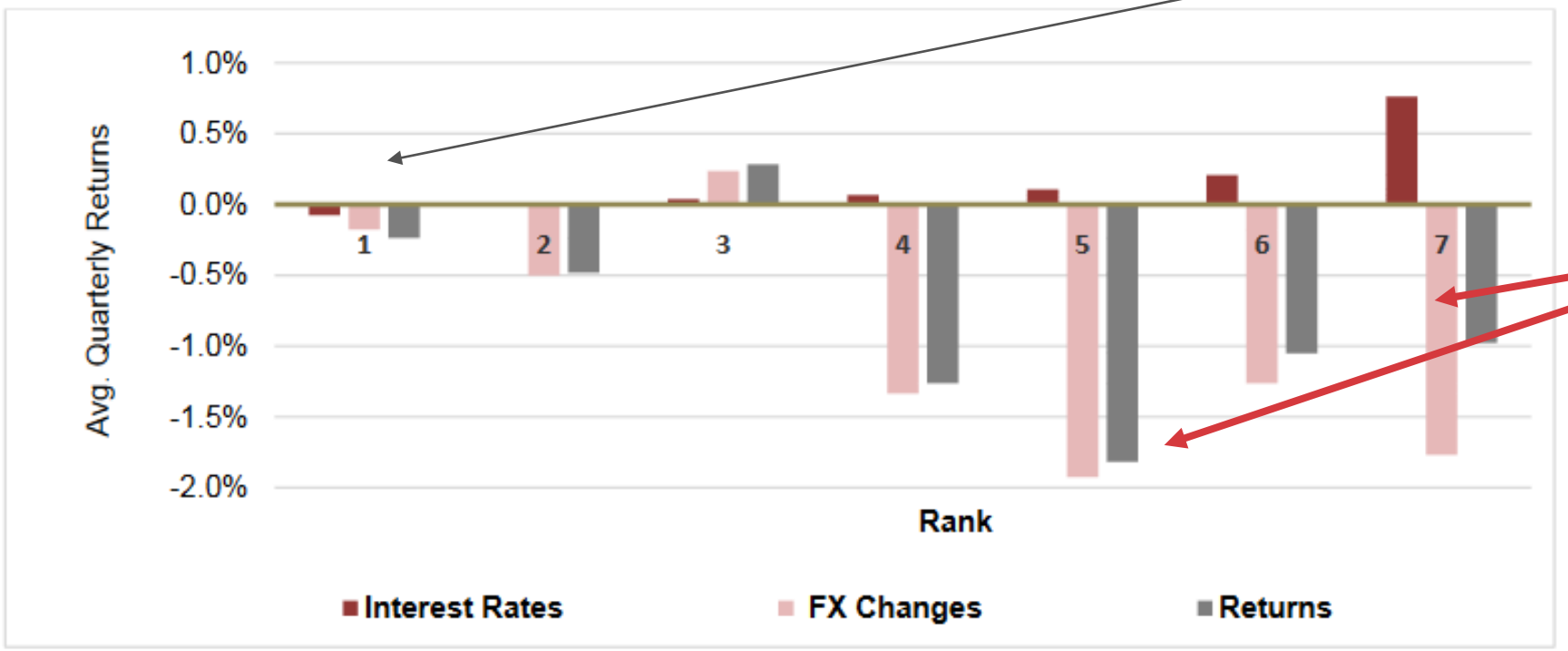


Source: https://www.brandes.com/docs/default-source/brandes-institute/2017/currency-carry-trade

CARRY TRADES: EXPLAINED AWAY

Exhibit 4: Currency Changes Generally Benefited "Reverse" Carry Trade Since Jan. 2012

Average Quarterly Returns, (January 2012 – June 2016)



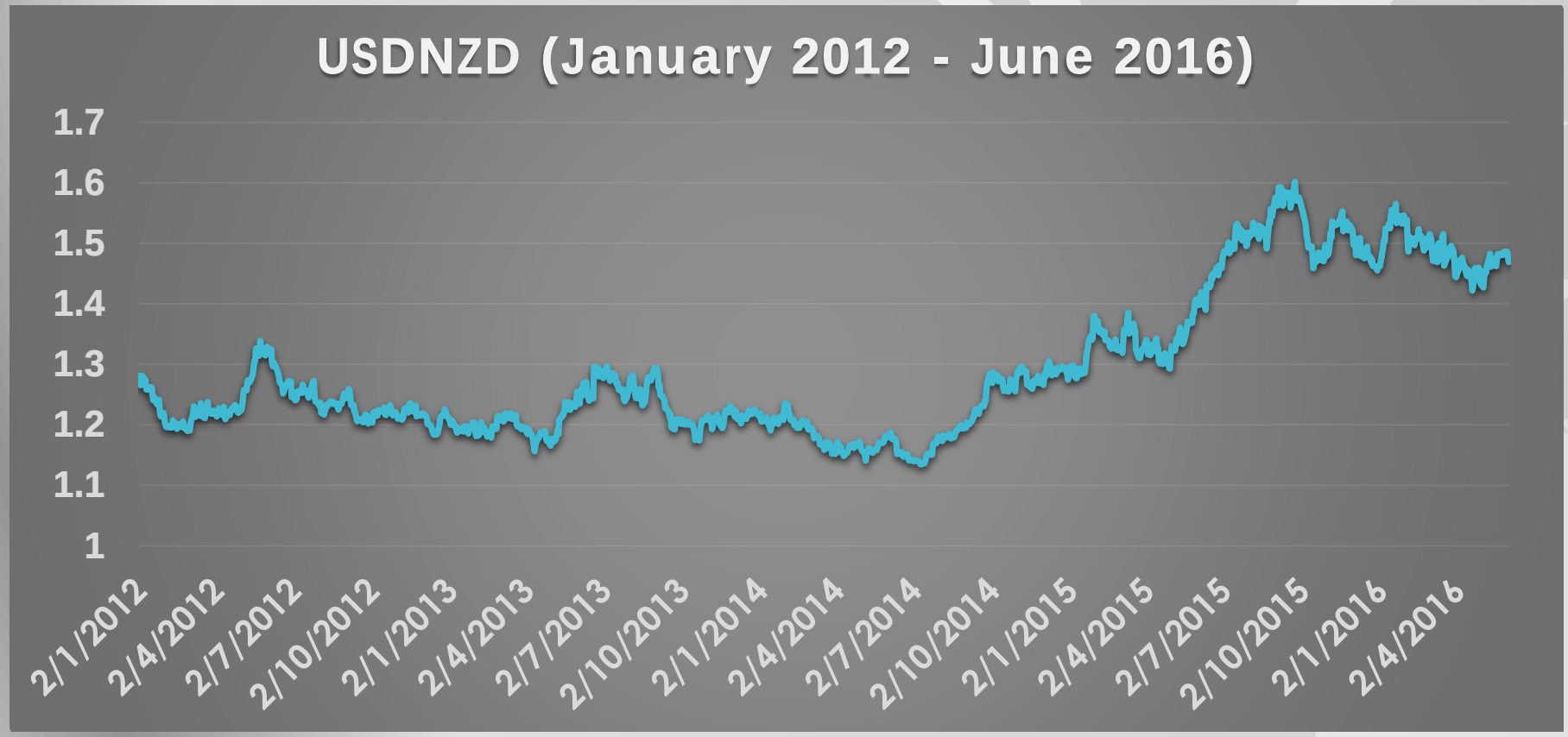
Source: Bloomberg, Datastream, Brandes Institute, as of 6/30/16. Past performance is not a guarantee of future results.

Not much going on

Action, high rate currencies depreciate "a lot"

Source: https://www.brandes.com/docs/default-source/brandes-institute/2017/currency-carry-trade

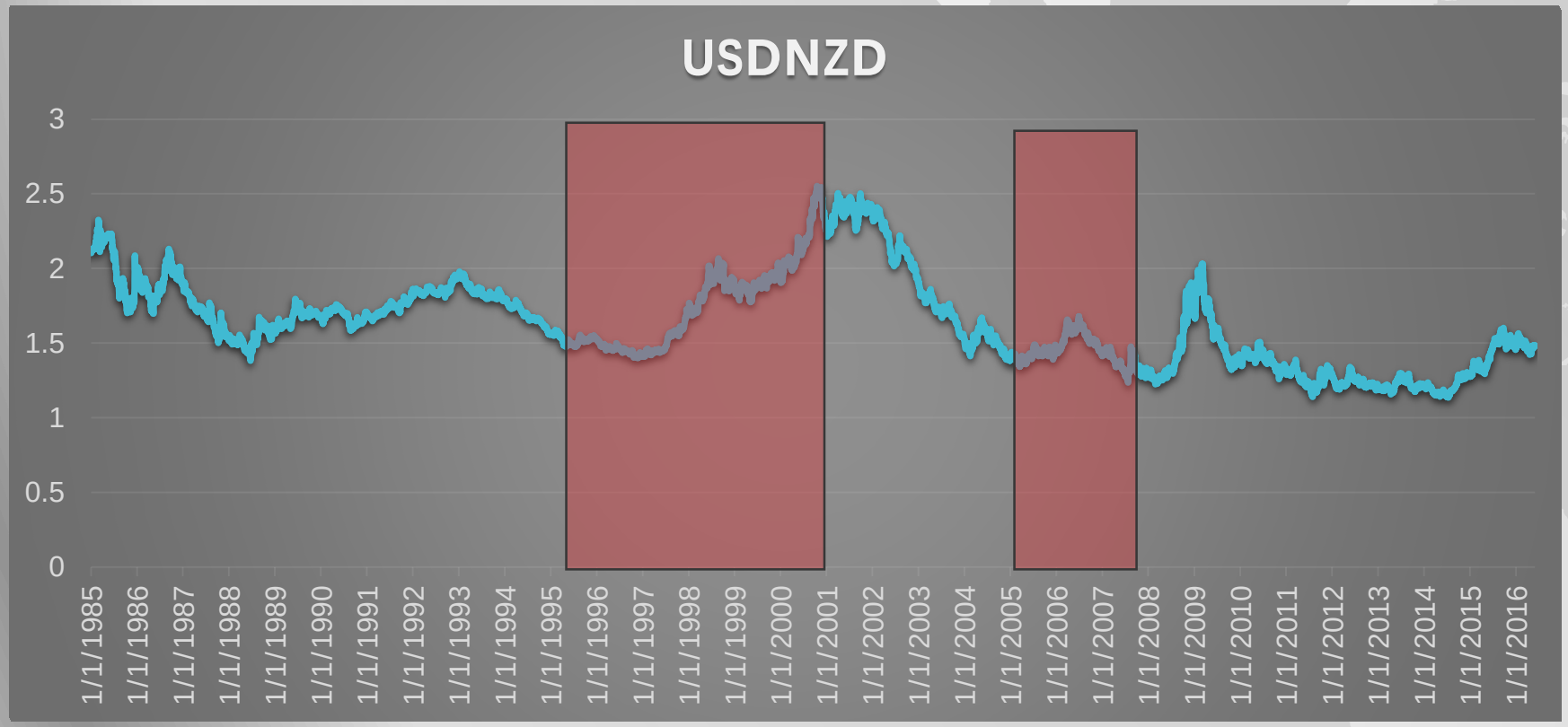
CARRY TRADES STATIC PROFITS - GONE



NZD depreciates by 30%

Source: US Fed, Economics Research Data, Created by the presenter

CARRY TRADES: GOOD OLD TIMES – GONE

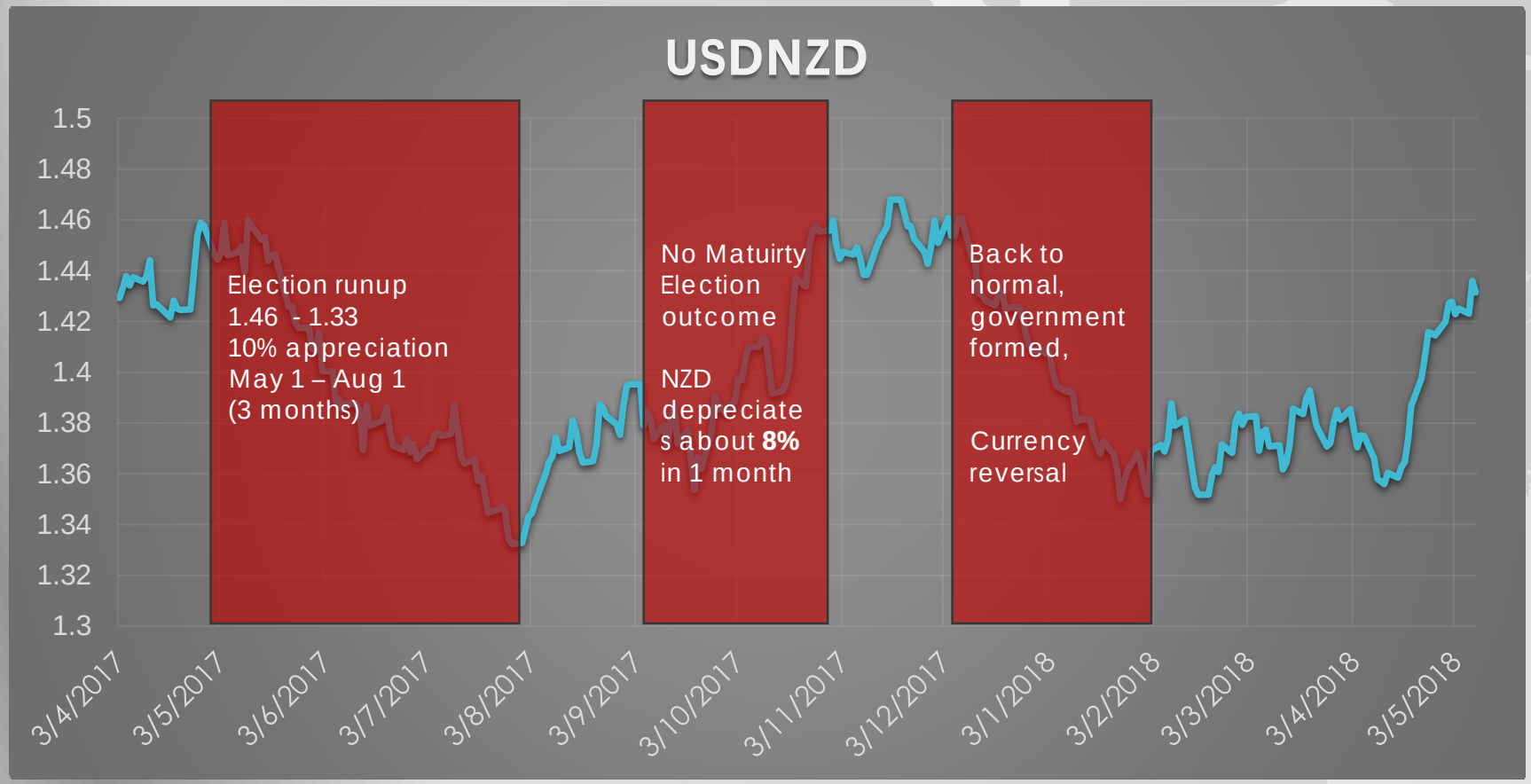


Source: US Fed, Economics Research Data, Created by the presenter

It would be interesting to show whether the carry trade profits during neg AFD time disappear because of the long side or the short side

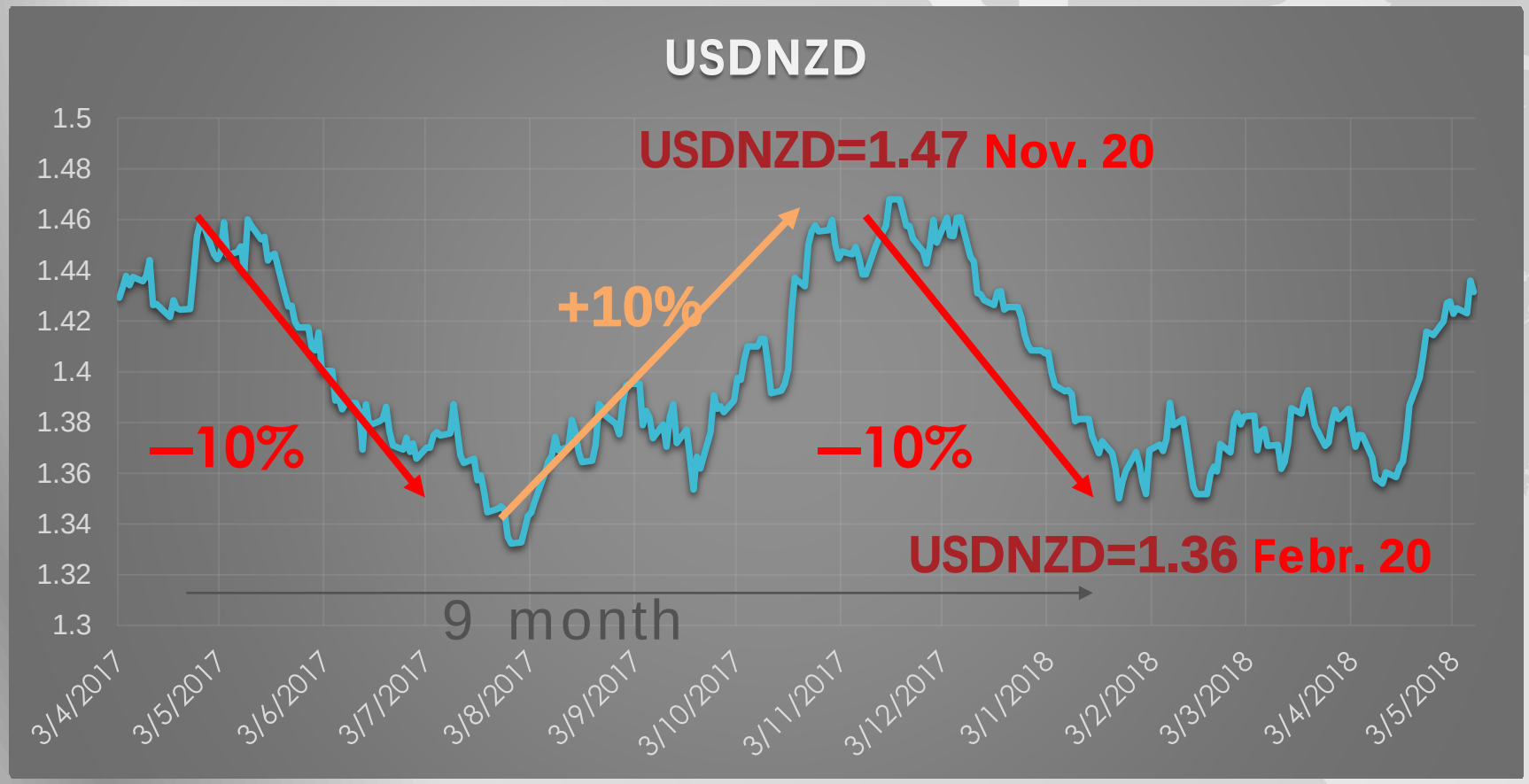
(This graph implies that long side resulted in large losses during 95-01)

CARRY TRADES: THE NEW WORLD - EXTREME VOLATILITY



Source: US Fed, Economics Research Data, Created by the presenter

CARRY TRADES: THE NEW WORLD - EXTREME VOLATILITY



It could be interesting to recalibrate the model based on the last 10 years, or 6 years of data, where short term volatility increased

2018 ASIAN BUREAU OF FINANCE AND ECONOMIC RESEARCH (ABFER)

Carry Trades and Global Risk

By George Panayotov

An insightful, Technical Paper, encouraging more FOREX and Global Asset Pricing Research