Class 9: International Equity Markets and Currency Carry Trade
Financial Markets, Fall 2020, SAIF

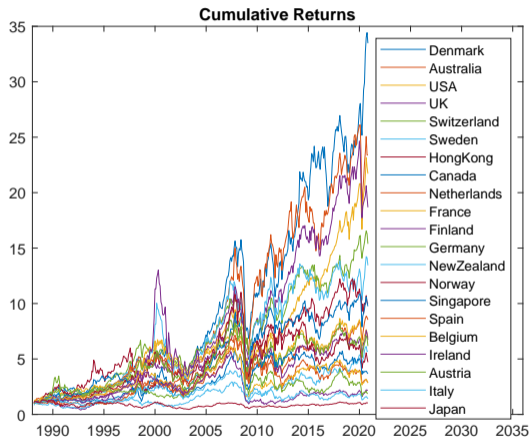**Jun Pan**

Shanghai Advanced Institute of Finance (SAIF)
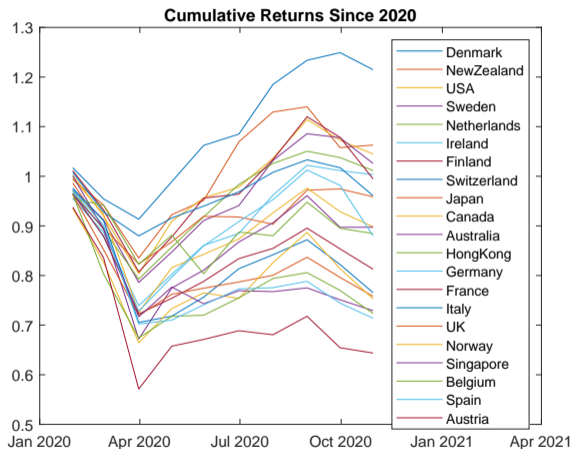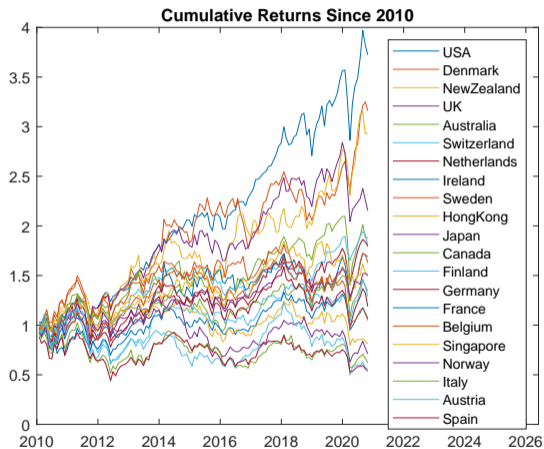**Shanghai Jiao Tong University**

December 2, 2020

Outline

- International Equity Markets
- Currency Carry Trade.

Monthly Equity Performance 1988-2020, MSCI Developed Countries

Country	Mean (%)	T-Stat	Std (%)	min (%)	max (%)
Denmark	1.05	3.76	5.55	-25.67	18.29
Australia	0.99	3.28	5.95	-25.49	18.14
Sweden	0.91	2.59	6.94	-26.66	22.84
USA	0.87	4.14	4.19	-17.10	13.15
UK	0.86	3.57	4.78	-18.75	14.80
Finland	0.84	1.98	8.46	-31.77	32.67
HongKong	0.83	2.35	7.02	-29.08	32.92
Switzerland	0.81	3.41	4.70	-15.72	16.46
Canada	0.73	2.67	5.43	-26.96	21.24
Netherlands	0.69	2.58	5.32	-25.17	14.34
Germany	0.67	2.08	6.40	-24.35	22.49
Norway	0.67	1.82	7.29	-33.36	18.91
France	0.66	2.28	5.77	-22.43	20.80
NewZealand	0.65	2.01	6.44	-22.46	27.23
Singapore	0.56	1.65	6.77	-29.18	25.67
Spain	0.50	1.46	6.75	-25.44	21.62
Austria	0.46	1.20	7.57	-37.34	25.28
Belgium	0.45	1.51	5.86	-36.56	24.75
Ireland	0.40	1.26	6.24	-26.20	19.22
Italy	0.33	0.95	6.95	-23.62	21.41
Japan	0.17	0.59	5.71	-19.42	24.18

Cumulative Returns

Legend: Denmark, Australia, USA, UK, Switzerland, Sweden, HongKong, Canada, Netherlands, France, Finland, Germany, NewZealand, Norway, Singapore, Spain, Belgium, Ireland, Austria, Italy, Japan

Cumulative Returns Since 2010

Cumulative Returns Since 2020

International Equity Markets Comovements with the US

Country	Corr (%)	T-Stat	Beta	T-Stat	R2 (%)
Canada	77.93	27.53	1.01	24.62	60.73
Netherlands	75.60	21.34	0.96	22.87	57.15
UK	74.51	21.41	0.85	22.12	55.52
France	72.95	18.77	1.00	21.12	53.22
Germany	72.43	16.09	1.11	20.80	52.47
Sweden	69.97	14.98	1.16	19.39	48.96
Australia	66.33	12.36	0.94	17.55	43.99
Belgium	65.55	14.10	0.92	17.18	42.96
Ireland	65.41	14.50	0.97	17.12	42.78
Switzerland	64.24	13.90	0.72	16.60	41.26
Norway	63.34	14.02	1.10	16.21	40.13
Spain	62.96	14.76	1.01	16.04	39.63
Singapore	62.42	15.53	1.01	15.82	38.96
Finland	60.14	12.98	1.21	14.91	36.17
Denmark	59.72	11.86	0.79	14.74	35.66
HongKong	56.68	14.28	0.95	13.62	32.13
Italy	56.65	9.18	0.94	13.61	32.09
Austria	53.68	6.68	0.97	12.60	28.82
NewZealand	51.16	8.13	0.79	11.79	26.17
Japan	46.33	8.23	0.63	10.35	21.46

Correlation with US (%)

- median
- 75 percentile
- 25 percentile
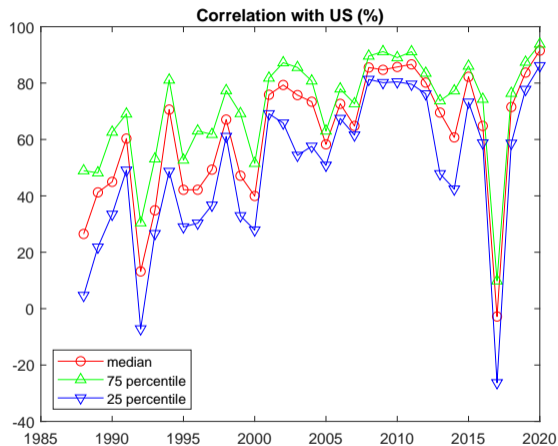
International Equity Markets Momentum

EWMA Average of Rho (%)
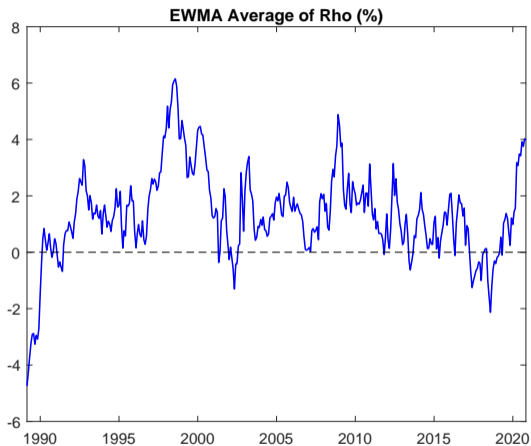
Fama-MacBeth Regression

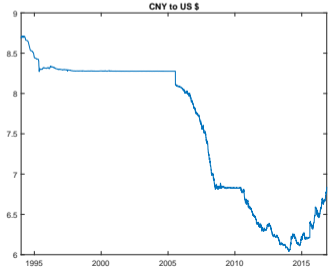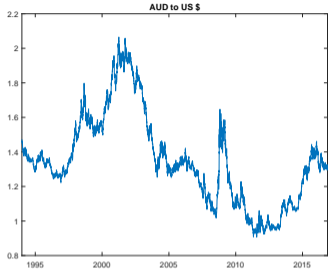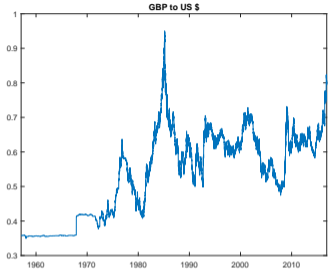- Cross-country regression for month t:

$$R_t^i = a + \rho_t \, R_{t-12,t-2}^i + \epsilon_i$$

- Time-series average of ρ_t: 1.77%.
- Its standard deviation: 10.95%.
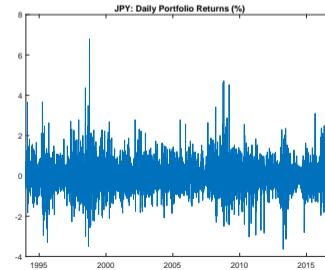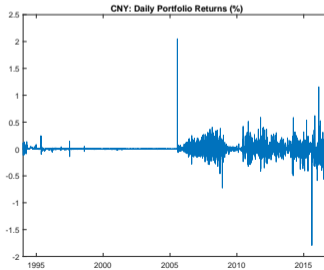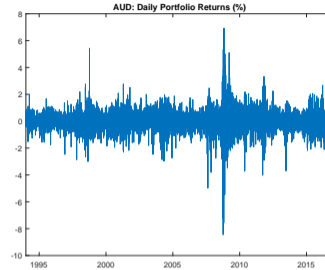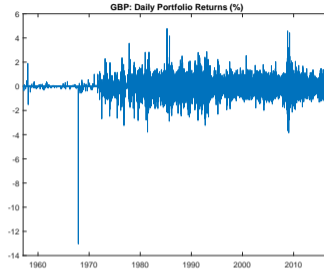- The standard error of ρ:

$$\frac{10.95\%}{\sqrt{N}} = 0.56\%$$

- T-stat of $\rho = \frac{1.77\%}{0.56\%} = 3.16$.

Foreign Currency per US Dollar

Daily Currency Returns

Daily Returns from 2000 through 2016

std (%)	GBP	EUR	AUD	CAD	CNY	INR	JPY	CHF	THB	RUB
	0.60	0.63	0.82	0.59	0.10	0.38	0.64	0.70	0.36	0.77

corr (%)	GBP	EUR	AUD	CAD	CNY	INR	JPY	CHF	THB	RUB
GBP		64.4	53.1	45.3	12.9	25.2	12.3	49.7	18.6	23.9
EUR	64.4		55.3	46.0	10.4	23.3	27.5	78.2	21.1	25.7
AUD	53.1	55.3		62.3	12.8	33.9	2.9	39.2	23.4	32.8
CAD	45.3	46.0	62.3		9.4	27.0	1.0	32.7	19.9	33.3
CNY	12.9	10.4	12.8	9.4		16.8	5.6	8.8	16.1	10.7
INR	25.2	23.3	33.9	27.0	16.8		-4.0	15.1	25.5	26.6
JPY	12.3	27.5	2.9	1.0	5.6	-4.0		37.5	17.6	-1.1
CHF	49.7	78.2	39.2	32.7	8.8	15.1	37.5		17.7	19.3
THB	18.6	21.1	23.4	19.9	16.1	25.5	17.6	17.7		15.9
RUB	23.9	25.7	32.8	33.3	10.7	26.6	-1.1	19.3	15.9	

One-Month LIBOR Rates
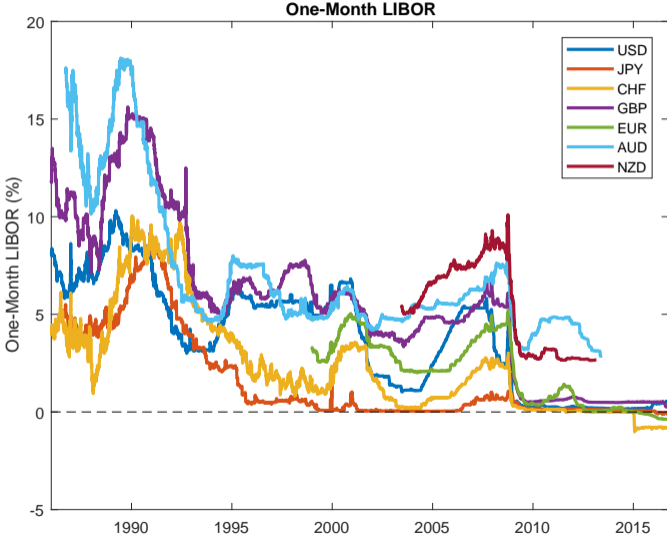
Currency Carry Trade

- Take long position on "asset/target" currencies with high interest rates.
- Borrow from "funding" currencies with low interest rates.
- The Japanese Yen is the most often used funding currency (Yen Carry).
- Two drivers for returns:
  - The interest rate differential (positive carry).
  - Gain/loss in the spot market when unwind the trade.
- On average, currency carry trade is a profitable trading strategy, but is sensitive to the liquidity condition of the global markets.
- Large losses in currency carry were often incurred during global sell-off of risky assets (flight to quality). Accompanied with the large losses in currency carry is the sudden strengthening in Yen (or other funding currencies) as carry traders seek to unwind their trades.

A Portfolio Approach to Currency Carry

- Let's use USD as an anchor and calculate portfolio returns from the perspective of a US investor: in month t, borrow in USD and buy the foreign currency; in month t+1, unwind the trade.
- Let i^* and i be the foreign and US one-month risk-free rates. At month t, sort all currencies by interest rate differentials $i^* - i$ into 6 groups:
  - ▸ group 6: funding currencies with the lowest interest rates
  - ▸ group 1: target currencies with the highest interest rates.
- Calculate the realized return in month t+1, and equal weight all currencies within each of the 6 groups.
- The number of available currencies varies over time. For the period from 1987 through 2011, the sample starts with 17 currencies and reaches a maximum of 34 currencies. Since the launch of Euro in January 1999, the sample covers 24 currencies.

Portfolio Returns of Currency Carry

	Portfolio Rank	exret (%)	CAPM	
			beta	alpha (%)
"target" currency	1	0.79 [4.56]	0.19 [3.08]	0.69 [3.22]
	2	0.35 [2.39]	0.17 [3.64]	0.26 [1.55]
	3	0.28 [2.14]	0.12 [2.36]	0.22 [1.39]
	4	0.15 [1.21]	0.08 [1.91]	0.11 [0.77]
	5	-0.05 [-0.38]	0.07 [1.53]	-0.08 [-0.58]
"funding" currency	6	-0.18 [-1.37]	0.01 [0.24]	-0.18 [-1.30]

Monthly Data from January 1987 through December 2011

Principal Component Analysis on Currency Returns

The first three PC's of currency returns			
	PC 1	PC 2	PC3
E/sum(E)	54.03%	20.25%	10.10%
GBP	0.3748	-0.0312	0.2595
EUR	0.4538	0.1878	0.2925
AUD	0.5621	-0.4869	-0.4163
CAD	0.3324	-0.2946	-0.1879
JPY	0.1499	0.6699	-0.7030
CHF	0.4524	0.4371	0.3799

Currency Option Implied Smile