The long-term impact of China's monetary policy on global stock markets with a cointegration approach with smooth structural changes.

Coauthor

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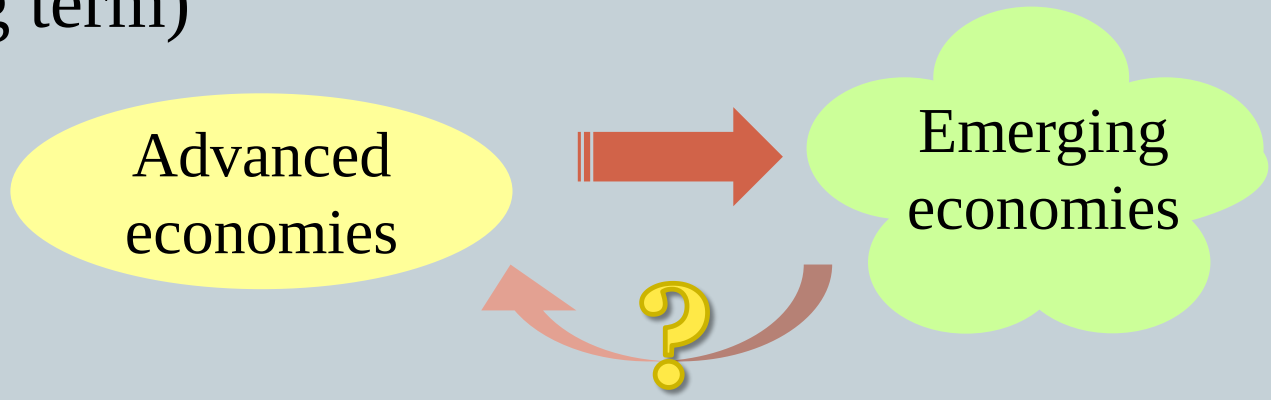
Introduction

I. Why China's Monetary Policy?
II. Why use Cointegration?
III. Why use Fourier function?
IV. How to use Fourier function
V. Research contributes

Introduction

I. Why China's Monetary Policy?

- Past literatures, Advanced economies monetary policy affects emerging economies stock markets. (Short term, Long term)



- Emerging economy, raises cross-border influences to the global stock markets has not been investigated.

Li et al. (2010), Ehrmann and Fratzscher (2004), Thorbecke (1997), MacDonald (2017), Georgiadis (2016), Tyers (2016), Canova (2005), see paper page 2.

Introduction

I. Why China's Monetary Policy?

- China is the strongest among emerging economies. Meanwhile according to Global Economic Prospects (2018, 2019, 2020) reports note that the global economy is deeply integrated with one of the major economies, China.

- Getting stronger. Deep integration of global economy.

Advanced?

NDEE?

Global Economic Prospects (2018, 2019, 2020), Sellin (2001), see paper page 2.

Introduction

II. Why use Cointegration?

- Economic variables are mostly non-stationary.
- Many literatures using the cointegration method in the past. A great contribution at capturing the long-run relationship among non-stationary variables.
- Tests for unit roots are shown to have low power in the presence of structural breaks that are not considered.

Engle and Granger (1987), Perron (1989), Banerjee et al. (1992), Zivot and Andrews (1992), see paper page 3.

Introduction

III. Why use Fourier function?

- Fourier-form approximation several advantages
  1) Reasonably well for the types of breaks often used in economic analysis.
  2) Fourier function can be a reasonable approximation for breaks of an unknown form.
  3) Avoids the complication of selecting break dates, the number of breaks, and the form of breaks.

Gallant's (1981), Beckeret al. (2004, 2006), Enders and Lee (2012a, 2012b), Rodrigues and Taylor (2012), Lee et al. (2016), see paper page 3~4.

Introduction

IV. How to use Fourier function

This paper proposes a test for cointegration in the presence of shifts in the level approximated by a Fourier component. When the data has structural changes, Fourier's results in size and power are better than traditional test.

Fourier function

OLS residual-based tests for cointegration

Phillips-Perron type

$Z_{\alpha,k}$
$Z_{t,k}$
Test statistics

Critical values
Size & power

Gregory and Hansen (1996) , Gabriel et al. (2002), Hatemi-J (2008), and Masuda (2010), see paper page 4.

Introduction

V. Research contributes

- Our study to use a new cointegration approach to explore the policy effect from a major emerging economy (China) to both NDEE and advanced economies.
- The cross-border long-run relationship and influence are partially evident.
  - China's monetary policy is cointegrated with the newly developed and emerging stock markets in Asia or near Asia.
  - However, the cointegration does not exist between China and the main developed stock markets.

Baum et al. (2015), see paper page 4.

Methodology

I. Cointegration regression
II. Unit Root Coefficient Estimation
III. Unit root test statistics
IV. Asymptotic distribution
V. Critical values
VI. Size & power

Methodology

I. Cointegration regression

- Fourier-form break in cointegration regression:

$$y_{1t} = \mu + \beta' \mathbf{y}_{2t} + \alpha_1 \cos(2\pi kt/T) + \alpha_2 \sin(2\pi kt/T) + e_t,$$

Eq(1)

- Null process (no cointegration)

$$\Delta \mathbf{y}_t = \begin{bmatrix} \Delta y_{1t} \\ \Delta \mathbf{y}_{2t} \end{bmatrix} = \sum_{s=0}^{\infty} \Psi_s \varepsilon_{t-s},$$

Eq(2)

Phillips and Ouliaris (1990), see paper page 5.

Methodology

II. Unit Root Coefficient Estimation

- Compute the cointegration test statistic for a best-fitted frequency k ∈ (1, 2, 3, 4, 5), for each k, estimate (1) by OLS, which yields the residual $\tilde{e}_{t, k}$. Select k^* with the minimization of these residuals' sum of squares (RSS).

See paper page 6.

Methodology

III. Unit root test statistics

- Phillips (1987) unit root test statistics:

$$Z_{\alpha,k} = (T-1)(\tilde{\rho}^* - 1),$$ Eq(8)

$$Z_{t,k} = \frac{(\tilde{\rho}^* - 1)}{\tilde{\sigma}^*_{\tilde{\rho}}}, \qquad \tilde{\sigma}^{*2}_{\tilde{\rho}} = (s^2 + 2\tilde{\lambda}_T) \Big/ \sum_{t=2}^{T} \tilde{e}^2_{t-1}.$$ Eq(9)

Phillips (1987), see paper page 6.

Methodology

IV. Asymptotic distribution

- Under the null hypothesis, $Z_{\alpha,k}$ and $Z_{t,k}$, then as $T \rightarrow \infty$:

$$Z_{\alpha,k} \xrightarrow{L} \frac{\int_0^1 QdQ}{\int_0^1 Q^2(r)dr} \text{ and}$$

$$Z_{t,k} \xrightarrow{L} \frac{\int_0^1 QdQ}{[(\int_0^1 Q^2(r)dr)\boldsymbol{\kappa_D}'\boldsymbol{\kappa_D}]^{\frac{1}{2}}},$$

Phillips (1987), see paper page 6. Proof see Appendix A.

Table 1. Critical values

Table 1

Critical values for the $Z_{\alpha,\kappa}$ and $Z_{t,\kappa}$ statistic

		$Z_{\alpha,\kappa}$							$Z_{t,\kappa}$				
m	k	0.1	0.075	0.05	0.025	0.01	m	k	0.1	0.075	0.05	0.025	0.01
	1	-28.1159	-29.9112	-32.3608	-36.3380	-41.3249		1	-3.8892	-4.0157	-4.1814	-4.4401	-4.7444
	2	-23.7573	-25.6604	-28.1945	-32.2869	-37.4032		2	-3.5841	-3.7256	-3.9086	-4.1895	-4.5155
1	3	-20.5927	-22.4069	-24.8924	-28.9355	-34.0650	1	3	-3.3466	-3.4909	-3.6802	-3.9708	-4.3111
	4	-19.0521	-20.7585	-23.1401	-27.0778	-32.2127		4	-3.2257	-3.3679	-3.5553	-3.8468	-4.1909
	5	-18.3414	-19.9578	-22.2158	-25.9406	-30.7844		5	-3.1693	-3.3065	-3.4874	-3.7682	-4.1067
	1	-33.4347	-35.3504	-37.9415	-42.1774	-47.4385		1	-4.2213	-4.3456	-4.5090	-4.7649	-5.0682
	2	-31.1571	-33.1327	-35.8349	-40.1893	-45.4949		2	-4.0791	-4.2111	-4.3842	-4.6542	-4.9650
2	3	-27.9090	-29.9011	-32.6240	-36.9828	-42.4516	2	3	-3.8595	-3.9998	-4.1840	-4.4634	-4.7958
	4	-25.8933	-27.8292	-30.4674	-34.7845	-40.1511		4	-3.7195	-3.8596	-4.0420	-4.3245	-4.6601
	5	-24.7206	-26.5968	-29.1825	-33.3269	-38.5581		5	-3.6363	-3.7756	-3.9565	-4.2391	-4.5697
	1	-38.3427	-40.3704	-43.1186	-47.5989	-53.0770		1	-4.5129	-4.6364	-4.7995	-5.0568	-5.3557
	2	-37.2356	-39.2967	-42.0998	-46.6082	-52.1748		2	-4.4522	-4.5790	-4.7470	-5.0063	-5.3118
3	3	-34.5613	-36.6915	-39.5550	-44.1347	-49.7471	3	3	-4.2848	-4.4205	-4.5970	-4.8697	-5.1880
	4	-32.4142	-34.4963	-37.3546	-41.9639	-47.5772		4	-4.1486	-4.2850	-4.4661	-4.7440	-5.0671
	5	-30.9581	-33.0315	-35.8210	-40.3292	-45.8746		5	-4.0531	-4.1917	-4.3720	-4.6489	-4.9734
	1	-43.0362	-45.1634	-48.0418	-52.6893	-58.3553		1	-4.7805	-4.9041	-5.0653	-5.3198	-5.6185
	2	-42.6649	-44.8394	-47.7141	-52.3848	-58.1511		2	-4.7655	-4.8911	-5.0547	-5.3104	-5.6122
4	3	-40.6597	-42.8676	-45.8289	-50.5686	-56.3286	4	3	-4.6476	-4.7789	-4.9495	-5.2133	-5.5223
	4	-38.5838	-40.8005	-43.7654	-48.5540	-54.4251		4	-4.5249	-4.6587	-4.8344	-5.1042	-5.4220
	5	-36.9664	-39.1461	-42.0963	-46.7973	-52.8056		5	-4.4262	-4.5609	-4.7379	-5.0119	-5.3327
	1	-47.6635	-49.8637	-52.8465	-57.6334	-63.5809		1	-5.0336	-5.1557	-5.3192	-5.5725	-5.8686
	2	-47.6541	-49.8974	-52.9223	-57.7596	-63.7626		2	-5.0388	-5.1633	-5.3258	-5.5802	-5.8798
5	3	-46.2159	-48.5177	-51.6042	-56.4986	-62.4933	5	3	-4.9601	-5.0881	-5.2579	-5.5164	-5.8227
	4	-44.3427	-46.6694	-49.7556	-54.7023	-60.8012		4	-4.8541	-4.9868	-5.1589	-5.4251	-5.7385
	5	-42.7211	-45.0373	-48.1501	-53.1289	-59.2002		5	-4.7617	-4.8953	-5.0726	-5.3410	-5.6584

Table 1. Critical values (continue)

Table 1

Critical values for the $Z_{\alpha,\kappa}$ and $Z_{t,\kappa}$ statistic

		$Z_{\alpha,\kappa}$					$Z_{t,\kappa}$				
m	k	0.1	0.075	0.05	0.025	0.01	0.1	0.075	0.05	0.025	0.01
6	1	-52.1186	-54.4125	-57.4979	-62.5052	-68.5760	-5.2711	-5.3935	-5.5562	-5.8091	-6.1036
	2	-52.4361	-54.7950	-57.9284	-62.8919	-69.1149	-5.2914	-5.4159	-5.5785	-5.8313	-6.1340
	3	-51.3799	-53.7676	-56.9204	-61.9859	-68.1933	-5.2364	-5.3639	-5.5297	-5.7877	-6.0944
	4	-49.7602	-52.1341	-55.3628	-60.4358	-66.5806	-5.1490	-5.2797	-5.4494	-5.7102	-6.0190
	5	-48.1766	-50.5776	-53.7740	-58.8547	-65.0876	-5.0639	-5.1949	-5.3659	-5.6321	-5.9447
7	1	-56.5270	-58.9334	-62.1679	-67.2883	-73.4941	-5.4983	-5.6217	-5.7861	-6.0355	-6.3321
	2	-56.8637	-59.2851	-62.5206	-67.6782	-74.0068	-5.5170	-5.6410	-5.8041	-6.0575	-6.3568
	3	-56.2767	-58.7134	-62.0081	-67.2291	-73.5365	-5.4879	-5.6139	-5.7801	-6.0357	-6.3373
	4	-55.0006	-57.4597	-60.7215	-66.0003	-72.4289	-5.4218	-5.5508	-5.7175	-5.9771	-6.2867
	5	-53.5834	-56.0425	-59.3356	-64.6202	-71.1098	-5.3487	-5.4777	-5.6481	-5.9122	-6.2262
8	1	-60.8464	-63.3278	-66.6611	-71.9433	-78.3903	-5.7122	-5.8371	-6.0007	-6.2521	-6.5528
	2	-61.4164	-63.8937	-67.2273	-72.5257	-78.8941	-5.7427	-5.8674	-6.0297	-6.2824	-6.5798
	3	-60.9551	-63.4450	-66.8195	-72.1583	-78.7288	-5.7213	-5.8460	-6.0123	-6.2677	-6.5707
	4	-59.9507	-62.4865	-65.8475	-71.2777	-77.8321	-5.6710	-5.7991	-5.9654	-6.2265	-6.5293
	5	-58.6598	-61.1843	-64.5964	-70.0125	-76.6080	-5.6057	-5.7350	-5.9053	-6.1683	-6.4770
9	1	-65.1449	-67.7193	-71.1084	-76.4995	-83.1077	-5.9218	-6.0469	-6.2082	-6.4619	-6.7597
	2	-65.7146	-68.2496	-71.6173	-77.0162	-83.5900	-5.9502	-6.0736	-6.2360	-6.4858	-6.7845
	3	-65.5541	-68.1201	-71.5461	-77.0142	-83.7486	-5.9434	-6.0690	-6.2330	-6.4861	-6.7899
	4	-64.6220	-67.2061	-70.7049	-76.2260	-82.8927	-5.8989	-6.0259	-6.1929	-6.4513	-6.7531
	5	-63.6079	-66.1968	-69.7468	-75.2726	-81.9921	-5.8488	-5.9778	-6.1468	-6.4073	-6.7123
10	1	-69.4082	-72.0204	-75.4854	-80.9929	-87.8279	-6.1236	-6.2476	-6.4087	-6.6611	-6.9631
	2	-69.8905	-72.5426	-76.0281	-81.5968	-88.2962	-6.1479	-6.2730	-6.4359	-6.6894	-6.9863
	3	-69.9148	-72.5569	-76.0413	-81.5981	-88.4412	-6.1498	-6.2744	-6.4371	-6.6912	-6.9931
	4	-69.3180	-71.9490	-75.4933	-81.0736	-87.8606	-6.1220	-6.2470	-6.4132	-6.6687	-6.9698
	5	-68.3440	-71.0270	-74.5415	-80.1573	-86.9894	-6.0758	-6.2035	-6.3695	-6.6287	-6.9313

Notes: y_t is generated as $y_t = y_{t-1} + \varepsilon_t$, with $y_0 = 0$ and $\varepsilon_t \overset{i.i.d.}{\sim} N(0, I_{m+1})$, where the critical value is obtained from 10,000 replications at sample size T=500 for 10%, 7.5%, 5%, 2.5%, and 1% levels. Thus, $\Lambda\Lambda' = I$ for the generated data, thereby simplifying the computation of the statistic. The $Z_{\alpha,\kappa}$ statistic is described by equation (8). The $Z_{t,\kappa}$ statistic is described by equation (9). k represents frequency which from the minimization of residuals' sums of squared RSS.

Table 2

Size and power

Comparison of size and power in traditional versus Fourier-form cointegration test when DGP have structural change.

Sample \ Statistic		Size	Power			
		$\rho=1$	$\rho=0.5$		$\rho=0$	
T=50	Z_α	0.0700	0.0296	(0.0272)	0.0768	(0.0700)
	$Z_{\alpha,\kappa}$ ✓	0.0556	0.6940	(0.6972)	1.0000	(1.0000)
	Z_t	0.0676	0.0248	(0.0216)	0.0716	(0.0632)
	$Z_{t,\kappa}$ ✓	0.0628	0.6812	(0.6620)	1.0000	(1.0000)
T=100	Z_α	0.0608	0.0736	(0.0632)	0.1664	(0.1500)
	$Z_{\alpha,\kappa}$ ✓	0.0680	1.0000	(1.0000)	1.0000	(1.0000)
	Z_t	0.0604	0.0636	(0.0560)	0.1584	(0.1456)
	$Z_{t,\kappa}$ ✓	0.0596	1.0000	(0.9996)	1.0000	(1.0000)
T=200	Z_α	0.0612	0.2412	(0.2208)	0.4816	(0.4316)
	$Z_{\alpha,\kappa}$ ✓	0.0608	1.0000	(1.0000)	1.0000	(1.0000)
	Z_t	0.0632	0.2100	(0.1948)	0.4652	(0.4284)
	$Z_{t,\kappa}$ ✓	0.0576	1.0000	(1.0000)	1.0000	(1.0000)

Empirical Model

I. Empirical Model
II. Data and Variables

Empirical Model

I. Empirical Model

- China's monetary policy { M2 + Rediscount rate (RR)

Hybrid channel

$$
\begin{aligned}
\ln\ Stock_t \quad &= \quad \mu + \boxed{\beta_1 \ln M2_{t-1} + \beta_2 \ln RR_{t-1}} + \beta_3' \ln \mathbf{X}_{t-1} + \alpha_1 \cos(2\pi kt/T) \\
&\quad + \alpha_2 \sin(2\pi kt/T) + e_t,
\end{aligned}
$$

Single channel

$$
\begin{aligned}
\ln\ Stock_t \quad &= \quad \mu + \boxed{\beta_1 \ln M2_{t-1}} + \beta_3' \ln \mathbf{X}_{t-1} + \alpha_1 \cos(2\pi kt/T) \\
&\quad + \alpha_2 \sin(2\pi kt/T) + e_t,
\end{aligned}
$$

$$
\begin{aligned}
\ln\ Stock_t \quad &= \quad \mu + \boxed{\beta_2 \ln RR_{t-1}} + \beta_3' \ln \mathbf{X}_{t-1} + \alpha_1 \cos(2\pi kt/T) \\
&\quad + \alpha_2 \sin(2\pi kt/T) + e_t,
\end{aligned}
$$

Sun (2013), Tillmann (2019), Tang et al. (2013), Sun et al. (2010), Ehrmann and Fratzscher (2009), see paper page 10.

Control variables：long-term interest rates, IPI or GDP, exchange rate, CPI annual growth rate.

Empirical Model

II. Data and Variables

Monthly data			
❶Newly developed and emerging economies (NDEE)		❷Advanced economies	
Taiwan	Jan. 1997~Jun. 2021 (293)	**United States**	Jan. 1997~Jun. 2021 (293)
Singapore	Aug. 1997~Jun. 2021(286)	**Canada**	Jan. 1997~May. 2021(292)
South Korea	Jan. 1997~Jun. 2021 (293)	**Japan**	Jan. 1997~Jun. 2021 (293)
Russia	Sep. 1997~May. 2021(284)	**Germany**	Jan. 1997~Jun. 2021 (293)
Thailand	Sep. 1999~Jun. 2021 (261)	**United Kingdom**	Jan. 1997~Jun. 2021 (293)
Malaysia	Mar. 2000~Jun. 2021 (255)	**France**	Jan. 1997~May. 2021(292)
Philippines	Jul. 2000~Jun. 2021 (251)	**New Zealand**	Jan. 1997~Jan. 2021 (288)
Indonesia	Aug. 2004~Jun. 2021 (202)	**Australia**	Jan. 1997~Feb. 2021 (289)
India	Mar. 1998~Jun. 2021 (279)		(Observations)

Control variables： Ahmed et al. (2017), Peerman (2005), Huber (2016), see paper page 11~12.

Empirical Analysis

I. Group 1： Newly developed and emerging economies (NDEE)
II. Group 2： Advanced economies

Hybrid channel

Single channel

Table 3

Fourier-form break Cointegration test of China's monetary policy and NDEE stock market index

Policy variables	Ln M2 $_{t-1}$ + RR $_{t-1}$				Ln M2 $_{t-1}$			RR $_{t-1}$		
Eq	(10)				(11)			(12)		
Coin Test / Economies	k	$Z_{\alpha,k}$ / $Z_{t,k}$	β_1 (se)	β_2 (se)	k	$Z_{\alpha,k}$ / $Z_{t,k}$	β_1 (se)	k	$Z_{\alpha,k}$ / $Z_{t,k}$	β_2 (se)
Taiwan	2	-95.293 ***	-0.107 *	-0.025 *	2	-93.513 ***	-0.075	2	-87.561 ***	-0.017
		-7.424 ***	(0.06)	(0.01)		-7.332 ***	(0.06)		-7.040 ***	(0.01)
Singapore	3	-65.214 **	-0.026	-0.042 **	1	-58.713 **	-0.022	3	-61.431 **	-0.040 **
		-6.098 ***	(0.06)	(0.02)		-5.745 **	(0.08)		-5.895 ***	(0.02)
South Korea	2	-71.982 ***	0.129 **	0.012	2	-72.864 ***	0.149 ***	2	-68.520 ***	0.029 **
		-6.338 ***	(0.05)	(0.01)		-6.399 ***	(0.04)		-6.140 ***	(0.01)
Russia	1	-53.916 *	2.056 ***	-0.001	1	-53.917 **	2.055 ***	2	-53.129 **	-0.041
		-5.533 *	(0.32)	(0.04)		-5.533 **	(0.32)		-5.375 **	(0.04)
Thailand	2	-56.260 *	0.424 ***	-0.028	2	-51.685 *	0.422 ***	2	-29.924	-0.020
		-5.689 **	(0.04)	(0.02)		-5.463 **	(0.04)		-3.729	(0.03)
Malaysia	2	-41.356	0.111	0.007	2	-41.778	0.116	2	-43.082	0.008
		-5.161	(0.12)	(0.02)		-5.225 *	(0.12)		-5.249 *	(0.02)
Philippine	2	-53.762 *	0.426 ***	-0.024	2	-53.108 **	0.428 ***	1	-48.910 *	-0.011
		-5.580 **	(0.05)	(0.02)		-5.537 **	(0.05)		-5.271 *	(0.03)
Indonesia	2	-52.994 *	0.444 ***	-0.017	2	-50.411 *	0.437 ***	1	-40.665	0.010
		-5.503 *	(0.05)	(0.02)		-5.344 **	(0.05)		-5.134 *	(0.03)
India	2	-52.843 *	0.327 ***	-0.032	2	-45.383	0.332 ***	1	-56.257 **	-0.032
		-5.342 *	(0.04)	(0.02)		-4.920	(0.04)		-5.680 **	(0.03)
Controls variables	Yes				Yes			Yes		

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8/9

Hybrid channel or single channel, all support the long-term cointegration relationship between China's monetary policy and the stock markets of NDEE.

Empirical Analysis

I. Group 1：NDEE

See Table 3

- Hybrid channel ：M2 +RR
  - 8/9 NDEE' economies have cointegration (rejected H_0).
  - Only Malaysia shows no cointegration.

- Single channel ：M2
  - Only India shows no cointegration.
- Single channel ：RR
  - Only Thailand shows no cointegration.

Sun (2015), Ahmed et al. (2017), Bowman et al. (2015), Kim (2001), Mackowiak (2007) , Feldkircher and Huber (2016),see paper page 12~13.

See Table 4

Table 4
Cointegration test of China's monetary policy and the advanced economies stock market index

Policy variables		Ln M2 $_{t-1}$+ RR $_{t-1}$				Ln M2 $_{t-1}$			RR $_{t-1}$	
Eq		(10)				(11)			(12)	
Coin Test / Economies	k	$Z_{\alpha,k}$ / $Z_{t,k}$	$\hat{\beta}_1$ (se)	$\hat{\beta}_2$ (se)	k	$Z_{\alpha,k}$ / $Z_{t,k}$	$\hat{\beta}_1$ (se)	k	$Z_{\alpha,k}$ / $Z_{t,k}$	$\hat{\beta}_2$ (se)
U.S. 1 (S&P 500)	1	-39.891	0.388 ***	-0.008	1	-38.384	0.414 ***	1	-61.487 **	-0.061 ***
		-4.680	(0.06)	(0.01)		-4.577	(0.05)		-6.227 ***	(0.01)
U.S. 2 (NASDAQ)	1	-37.472	0.394 ***	-0.093 ***	1	-18.517	0.691 ***	1	-67.027 ***	-0.146 ***
		-4.691	(0.14)	(0.03)		-3.218	(0.12)		-6.528 ***	(0.02)
Canada	3	-37.773	0.264 ***	0.020 **	2	-42.598	0.309 ***	3	-70.556 ***	0.002
		-4.325	(0.05)	(0.01)		-4.756	(0.05)		-6.260 ***	(0.01)
Japan	1	-45.264	0.181 ***	0.018	1	-47.143	0.155 **	1	-31.041	-0.003
		-4.959	(0.07)	(0.02)		-5.063 *	(0.06)		-3.957	(0.02)
Germany	3	-30.223	0.287 ***	0.029	2	-45.994	0.183 ***	2	-61.105 **	-0.003
		-3.951	(0.09)	(0.02)		-4.940	(0.07)		-5.829 **	(0.02)
U.K.	4	-37.937	0.110	0.034 ***	4	-27.373	-0.019	4	-32.955	0.027 ***
		-4.4533	(0.08)	(0.01)		-3.669	(0.07)		-4.106	(0.01)
France	4	-33.431	0.125	0.007	4	-32.917	0.101	4	-31.069	-0.006
		-3.951	(0.09)	(0.02)		-3.909	(0.07)		-3.790	(0.01)
New Zealand	1	-29.567	0.348 ***	0.036 ***	1	-18.763	0.246 ***	2	-29.138	0.029 ***
		-3.993	(0.07)	(0.01)		-3.132	(0.07)		-3.771	(0.01)
Australia	2	-24.106	0.369 *	-0.002	2	-24.193	0.384 *	2	-25.877	-0.011
		-3.525	(0.22)	(0.01)		-3.530	(0.20)		-3.741	(0.01)
Controls variables			Yes				Yes			Yes

0/8 | 1/8 | 3/8

Notes：$^{*}p < 0.1$, $^{**}p < 0.05$, **
Refer to the appendix for details o[...]ple period, controls variables and observations of ea[...]omy. Standard errors in parentheses. Eq (1[...]e Fourier-form cointegration approach with multiple monetary policy measure. Eq (11) and (12) are the Fourier-form cointegration approach with a single monetary policy measure. U.S. 1 refers to S&P 500. U.S. 2 refers to NASDAQ. We also do other European economies such as Austria, Belgium, Denmark, Netherlands, Norway, Sweden, Switzerland, Finland. The above empirical results have no cointegration.

Empirical Analysis

II. Group 2：Advanced economies

See Table 4

- Hybrid channel ：M2 +RR
  - 0/8 Advanced' economies all appear no cointegration.
- Single channel ：M2
  - Only weak evidence of cointegration in Japan.
- Single channel ：RR
  - Only U.S., Canada, and Germany have cointegration results.

See paper page 13~16.

Conclusion

I. Methodologically
II. Empirically

Conclusion 1

I. Methodologically

- We use a new proposed residual-based Fourier-form cointegration method to investigate the above questions for selected NDEE and advanced economies.
- The new cointegration approach is proven to bring higher power of test given an accurate size distortion.

See paper page 16.

Conclusion 2

II. Empirically

- The long-term cointegration relationship between China’s monetary policy and NDEE has a significant impact on the stock price index, regardless of hybrid or single channels.
- The advanced economies have little response to China’s monetary policy, and the impact on the stock price index of advanced economies is weak, and only a very small number of RR channels have a cointegration relationship.

See paper page 16~17.

THANK YOU FOR LISTENING.