Identifying country-specific shocks in EM exchange rates

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Taper talk was a major event for EMs

- EM exchange rates on average depreciated between 4-5% during May-Aug 2013
- There is a recent literature that looks at the announcement effects and transmission of news from the Fed to EMs during the taper talk period
- Aizenman et al. (2014), Ahmed et al. (2014), Chen et al. (2014), Eichengreen et al. (2014), Mishra et al. (2014)
- These papers broadly ascertain whether the exchange rate depreciation in EMs was linked to macroeconomic fundamentals and find evidence to support that claim
- There seems to be differential impact on EMs based on size of CAD, FD and size of financial markets
- INR, IDR, BRL, ZAR and TRL, also known as the Fragile-5 had the largest depreciation amongst all the EMs

Taper talk: Fragile-5

Raw weekly cumulated exchange rate returns
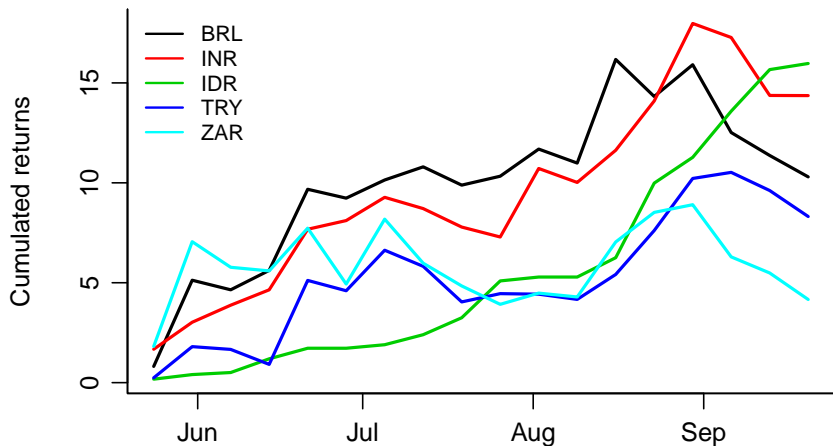
Were the Fragile-5 actually fragile?
Taper talk period

	Change in exchange rate returns (%)
Brazil	10.3
India	14.4
Indonesia	16
Turkey	8.3
South Africa	4.2
Fragile-5 average	10.6
EM average	5.2

- It seems like the Fragile-5 were actually fragile compared to other EMs
- But can we attribute the full exchange rate change of a country to facts about that country?

Are raw exchange rate returns informative?

$$d \log \left(\frac{\mathrm{X}}{\mathrm{CHF}} \right) = \beta_1 + \underbrace{\beta_2 d \log \left(\frac{\mathrm{USD}}{\mathrm{CHF}} \right) + \beta_3 d \log \left(\frac{\mathrm{GBP}}{\mathrm{CHF}} \right) + \beta_4 d \log \left(\frac{\mathrm{JPY}}{\mathrm{CHF}} \right) + \beta_5 d \log \left(\frac{\mathrm{DEM}}{\mathrm{CHF}} \right)}_{\text{External shocks}} + \underbrace{\epsilon}_{\text{Country Specific}}$$

- The Frankel-Wei (1994) regression gives us a framework to think about EM currencies
- The betas in the FW regression represent the co-movement coeffiecients of the regressors in model to the exchange rate being modelled
- Most EM currencies have high R^2 on the FW regression
- Changes in the FW regressors, USD/CHF, EUR/CHF, JPY/CHF and GBP/CHF are completely exogenous to the country
- What's specific to the country is just the ϵ

Example: Danish Krone

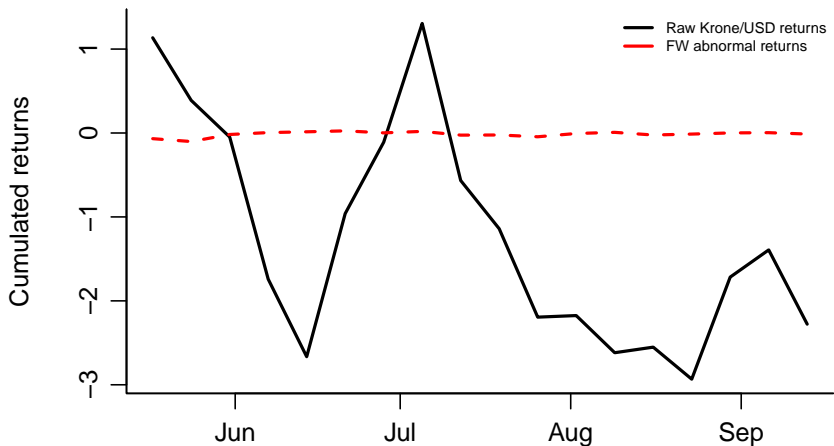DKK/USD, Taper talk period
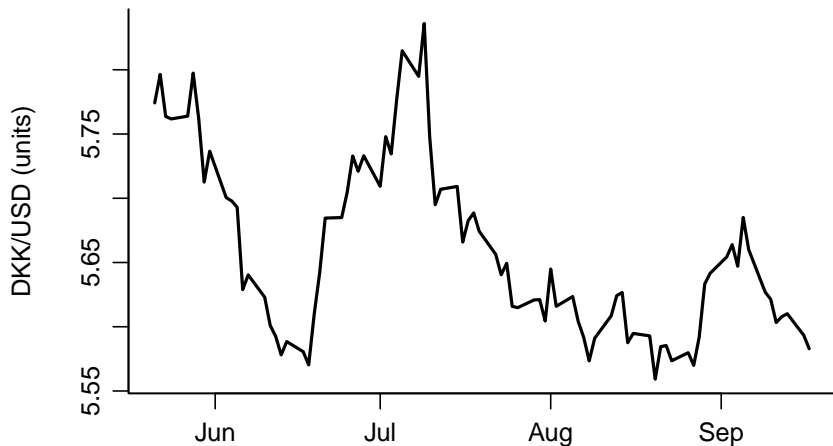
Example: Danish Krone

Raw returns v/s FW abnormal returns, Taper talk period

The key idea of this paper

1. Only the residuals of the FW regression are attributable to country-specific information
2. We augment and improve the FW regression with an EM factor
3. This significantly changes standard results and our understanding of the events of 2013

Part I

Methodology

Construction of the EM Factor

1. We first choose a list of major EMs (MSCI EMs)
2. Run a first stage FW regression for these EMs
3. We know that structural change is a problem for EMs, we utilise ZSP (2010) structural breaks and extract residuals based on the identified ZSP parameters
4. We further extract the first EM residual principal component (PC1) every 5 years that explains maximum variance
5. Finally, we augment the FW regression with the PC1 factor and run our structural break technology again. We use these identified structural parameters to extract country specific residuals

$$d \log \left(\frac{\mathrm{X}}{\mathrm{CHF}} \right) = \beta_1 + \underbrace{\beta_2 d \log \left(\frac{\mathrm{USD}}{\mathrm{CHF}} \right) + \beta_3 d \log \left(\frac{\mathrm{GBP}}{\mathrm{CHF}} \right) + \beta_4 d \log \left(\frac{\mathrm{JPY}}{\mathrm{CHF}} \right) + \beta_5 d \log \left(\frac{\mathrm{DEM}}{\mathrm{CHF}} \right)}_{\text{External AE shock}} + \underbrace{\beta_6 PC1}_{\text{External EM shock}} + \underbrace{\epsilon}_{\text{Country-specifi}}$$

Correlation ellipse: Factor loadings of PC1 and PC2

Variables factor map (PCA)
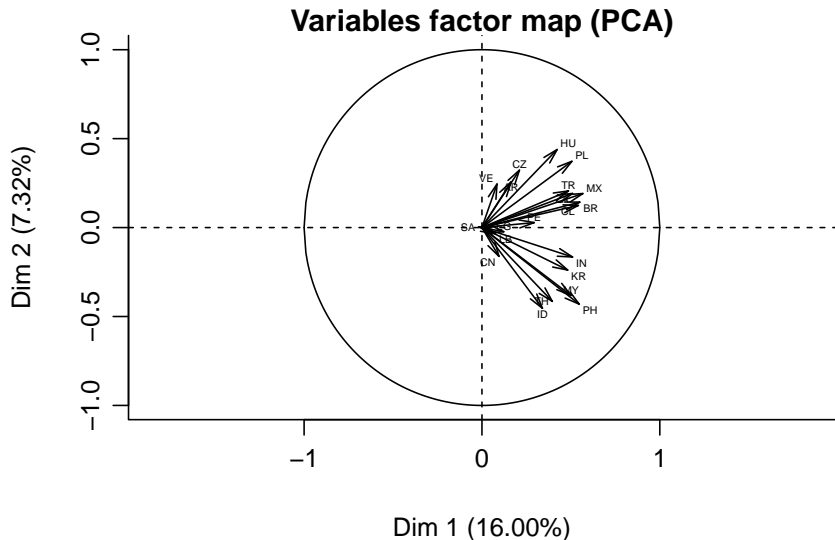
Does the EM PC1 look like a composite EM currency?

Cumulated returns, based to 100
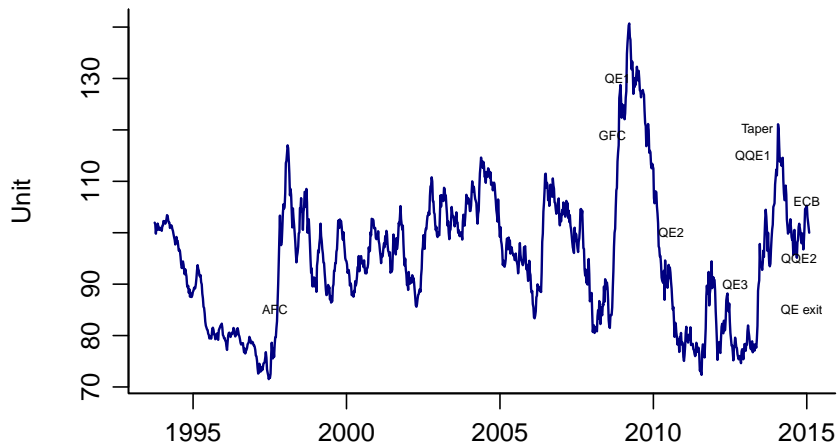
Evolution of EM PC1 coefficient

Unweighted mean using bootstrap

Evolution of EM PC1 coefficient

GDP weighted mean using bootstrap

An EM world?

Do the breakdates change when we add the EM factor?

Example: INR

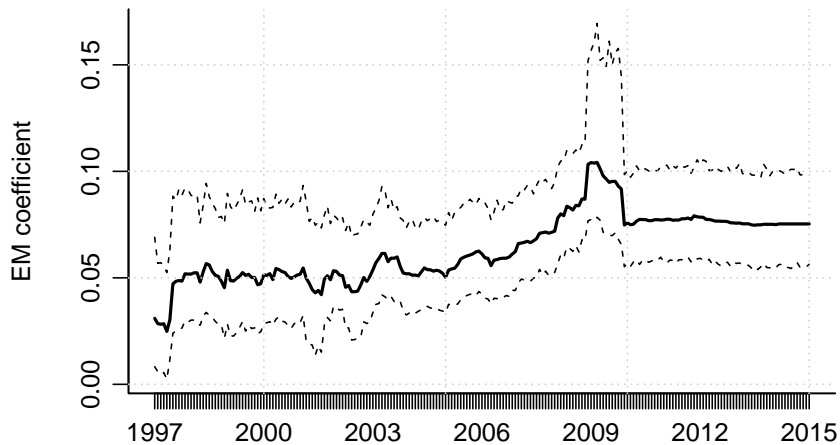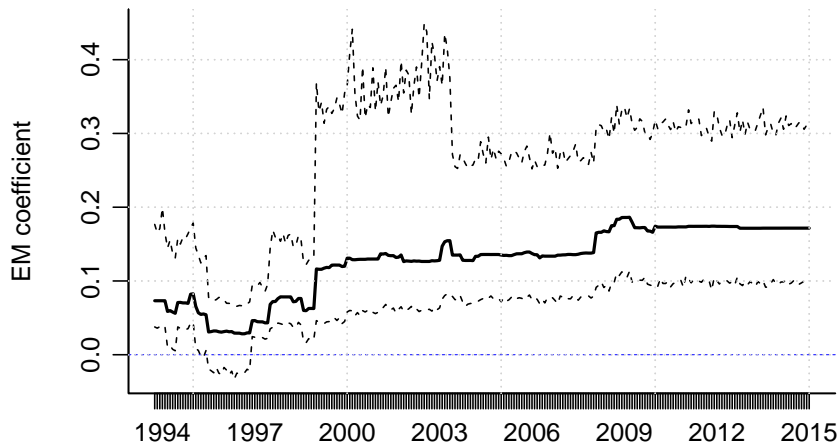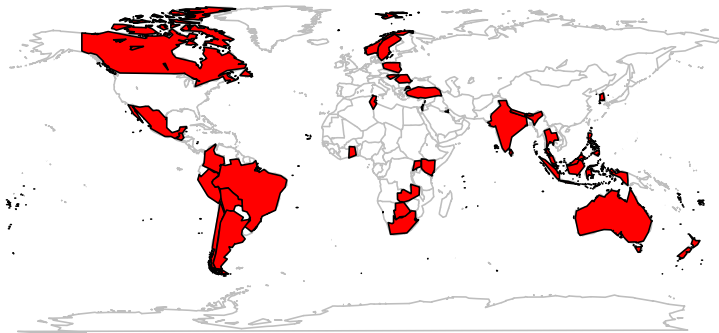|	Start.Date	End.Date	r2	us.chf	eu.chf	gb.chf	jp.chf	pca	Variance
1	1993-10-01	1995-03-10	1.00	0.99	0.04	0.01	-0.01	-	0.00
	1993-10-01	*1995-02-24*	*1.00*	*1.00*	*0.03*	*-0.01*	*-0.00*	*0.00*	*0.00*
2	1995-03-10	1996-08-09	0.78	1.01	-0.17	-0.04	-0.01	-	0.38
	1995-02-24	*1996-08-09*	*0.79*	*0.97*	*-0.15*	*-0.01*	*-0.01*	*0.14*	*0.37*
3	1996-08-16	1997-08-15	0.98	1.00	-0.05	0.03	0.00	-	0.03
	1996-08-16	*1997-08-15*	*0.98*	*0.99*	*-0.05*	*0.04*	*0.00*	*0.04*	*0.03*
4	1997-08-15	1998-10-30	0.65	0.67	0.34	-0.04	0.00	-	0.54
	1997-08-15	*1998-10-30*	*0.65*	*0.68*	*0.33*	*-0.04*	*0.00*	*0.01*	*0.54*
5	1998-11-06	2004-03-19	0.97	0.99	0.07	-0.00	0.01	-	0.07
	1998-10-30	*2004-03-19*	*0.97*	*0.98*	*0.07*	*0.00*	*0.01*	*0.03*	*0.06*
6	2004-03-19	2007-03-16	0.85	0.74	0.24	0.09	0.20	-	0.25
	2004-03-19	*2007-03-16*	*0.87*	*0.76*	*0.22*	*0.07*	*0.17*	*0.12*	*0.22*
7	2007-03-23	2013-10-18	0.53	0.67	0.14	0.15	-0.10	-	1.12
	2007-03-23	*2013-10-18*	*0.75*	*0.67*	*0.11*	*0.16*	*-0.08*	*0.30*	*0.60*

- The break dates don't change with the introduction of the EM PC1
- The loading on the EM PC1 is something about deeper aspects of the country and not quarter-to-quarter or year-to-year changes in macroeconomic conditions

Variance decomposition

Example: INR, last break period; 2007-03 to 2013-10
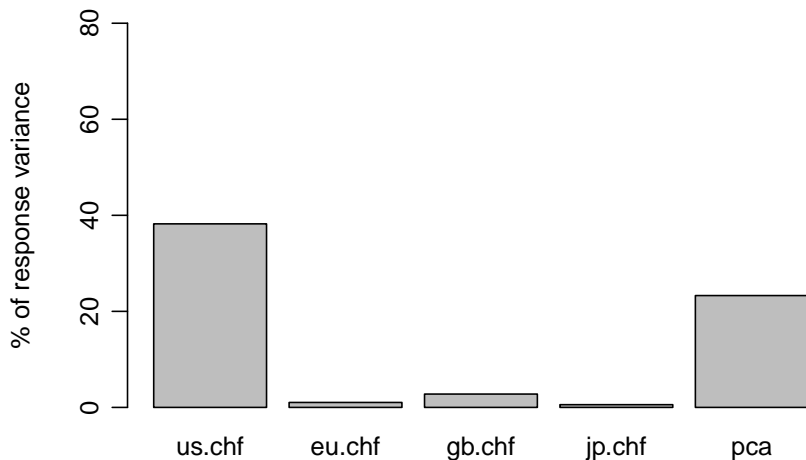
Total % of response variance explained=74.28%

Raw returns v/s FW v/s AFW

Example: INR
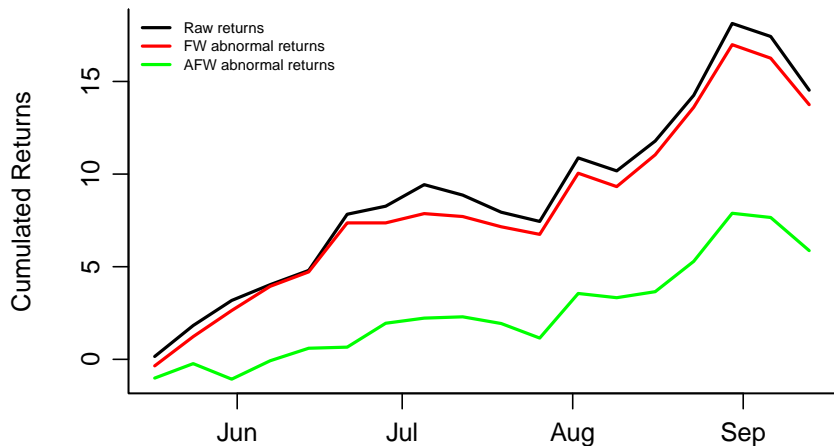
Part II

Results

Were the Fragile-5 actually fragile?

Taper talk period

% change	Raw returns	FW abnormal returns	AFW abnormal returns
Brazil	10.2	13.2	-0.05
India	14.4	13.7	5.9
Indonesia	16	12.4	11.1
Turkey	8.3	11.9	2.6
South Africa	4.2	9.63	-3.2
Fragile-5 average	10.6	12.2	3.25
EM average	5.22	5.07	0.33

Examining the taper talk literature with country-specific returns

Overturns major results

- Replication of Eichengreen and Gupta (2014)
    - Authors find CAD, External financing and RER to be significant in driving change in raw exchange rate returns during the taper tantrum
    - We find that only lagged RGDP growth matters in determining the country specific movement in exchange rates
- Replication of Ahmed et al. (2014)
    - Authors find CAD, Govt. debt and a vulnerability index to be significant
    - We find short term debt to reserves, CPI inflation and bank credit to GDP to be significant
- We also replicate Mishra et al. (2014) and find that their results don't hold as well

A fresh look at the events of 2013

Who were the fragile five?

Country	Raw returns	Rank	AFW abnormal returns	Rank
CN	-0.37	17	0.48	9
IN	14.53	2	5.87	2
ID	15.89	1	11.15	1
MY	9.68	5	5.22	3
PH	6.23	12	1.59	8
KR	-1.81	20	-9.11	21
TH	6.64	10	4.73	4
EG	-0.90	19	-3.40	18
LB	0.50	13	0.21	10
SA	0.01	15	0.01	11
ZA	8.52	7	-3.25	17
AR	9.08	6	2.39	7
BR	12.12	3	-0.05	13
CL	6.73	9	-1.02	14
MX	7.63	8	-2.00	16
PE	6.40	11	4.45	5
VE	0.00	16	-0.00	12
HU	0.20	14	-4.59	19
PL	-0.81	18	-6.34	20
CZ	-2.40	21	-1.84	15
TR	11.85	4	2.57	6

Re-interpreting the results of 2013
Robust OLS

	(1)	(2)	(3)	(4)	(5)	(6)
			Dependent variable:			
			AFW abnormal returns (%)			
CAD/GDP (2012)	−0.024 (0.079)	0.022 (0.064)		0.013 (0.064)		0.025 (0.067)
Average annual % change in RER (2010-12)	−0.026 (0.164)					−0.052 (0.166)
Real GDP growth (2012)	0.368* (0.190)					0.336* (0.176)
Size (External financing, (2010-12), Log)	0.065 (0.082)			0.098 (0.063)	0.093 (0.067)	−0.037 (0.032)
Reserves/M2 ratio (2012)	0.0004 (0.029)				0.006 (0.028)	
Increase in CAD/GDP (2010-12) over (2007-09)			0.039 (0.100)		0.091 (0.095)	
Reserves/GDP (2012)		−0.002 (0.026)	−0.006 (0.027)	−0.002 (0.026)		
Short term debt to reserves (2012)		−0.037** (0.014)	−0.036** (0.016)			
CPI inflation (2012)		0.163** (0.067)	0.156** (0.074)	0.022 (0.042)	0.020 (0.044)	0.019 (0.045)
Bank credit/GDP 5-year change (2012)		0.046 (0.034)	0.045 (0.037)		−0.013 (0.035)	
FD/GDP (2012)		−0.107 (0.102)	−0.087 (0.101)	−0.104 (0.098)	−0.088 (0.110)	−0.060 (0.125)
Constant	−2.421 (2.499)	0.742 (0.983)	0.823 (1.035)	−2.258 (1.736)	−2.187 (2.175)	
Observations	38	38	38	41	41	38
Residual Std. Error	1.793 (df = 32)	2.062 (df = 31)	2.057 (df = 31)	2.204 (df = 35)	1.764 (df = 34)	1.917 (df = 32)

Note: *p$<$0.1; **p$<$0.05; ***p$<$0.01

Part III

Conclusions and future research

Raw exchange rate returns are not informative

- Most EMs have intermediate exchange rate regimes
- Exchange rate returns for these EM currencies are driven by changes in AE exchange rates
- We identify a common EM factor which when added to FW regression, explains a greater degree of variance
- When there is a global monetary policy shock, like the taper announcement, majority of the movement in EM exchange rates can be explained by changes in AE exchange rates and the common EM factor
- Brings into question the taper talk literature which studies movements in raw exchange rate returns and links it to macro-fundamentals
- CPI inflation, Short term external debt to GDP and RGDP growth are significant determinants of country specific exchange rate movements

Future areas of research

- Rigourous examination of what drives country-specific movements in EM exchange rates
- How does the country-specific factor react to country-specific news? i.e Does a monetary policy surprise by the RBI change the INR's country specific return series
- Measurement of spillovers on the exchange rate from AEs to EMs and EMs to EMs
- Possible utilisation of this decomposition technique on other asset prices. i.e What is the beta for Nifty in a market model with MSCI-world or S&P 500?
- Better event studies

Thank you.

Part IV

Appendix

Eichengreen and Gupta (2014)

Authors find CAD, External financing and RER to be significant

	Dependent variable:							
	% change in exchange rate returns				% change in FW abnormal returns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Increase in CAD/GDP (2010-12) over (2007-09)	−0.183	−0.208	−0.215		−0.133	−0.158	−0.168	
	(0.175)	(0.172)	(0.177)		(0.161)	(0.143)	(0.159)	
CAD/GDP (2012)				−0.056				0.014
				(0.106)				(0.100)
Average annual % change in RER (2010-12)	−0.460**	−0.508**	−0.544**	−0.521**	−0.212	−0.193	−0.100	−0.218
	(0.229)	(0.231)	(0.257)	(0.230)	(0.227)	(0.206)	(0.258)	(0.229)
Reserves/M2 ratio (2012)	−0.035	−0.036	−0.032	−0.048	−0.050	−0.046	−0.068*	−0.058
	(0.036)	(0.037)	(0.039)	(0.035)	(0.037)	(0.035)	(0.041)	(0.036)
Real GDP growth (2012)	0.197			0.271	0.109			0.203
	(0.302)			(0.286)	(0.299)			(0.282)
General Public Debt (2012)		−0.016				−0.038*		
		(0.027)				(0.023)		
Fiscal deficit/GDP (2012)			−0.046				0.194	
			(0.200)				(0.189)	
Size(External financing, (2010-12), Log)	0.156**	0.215***	0.171**	0.154**	0.186***	0.260***	0.265***	0.183***
	(0.066)	(0.073)	(0.078)	(0.066)	(0.068)	(0.069)	(0.082)	(0.070)
Observations	39	39	39	39	37	37	37	37
Residual Std. Error	3.300 (df = 34)	3.943 (df = 34)	3.941 (df = 34)	4.230 (df = 34)	3.374 (df = 32)	2.572 (df = 32)	3.206 (df = 32)	3.615 (df = 32)

Note: *p<0.1; **p<0.05; ***p<0.01

Eichengreen and Gupta (2014)

RGDP growth matters when considering the effect of taper on country specific factor

	% change in exchange rate returns				% change in AFW abnormal returns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Increase in CAD/GDP (2010-12) over (2007-09)	−0.183	−0.208	−0.215		−0.031	−0.089	−0.087	
	(0.175)	(0.172)	(0.177)		(0.098)	(0.101)	(0.100)	
CAD/GDP (2012)				−0.056				0.008
				(0.106)				(0.060)
Average annual % change in RER (2010-12)	−0.460**	−0.508**	−0.544**	−0.521**	−0.013	−0.081	−0.141	−0.016
	(0.229)	(0.231)	(0.257)	(0.230)	(0.137)	(0.145)	(0.163)	(0.139)
Reserves/M2 ratio (2012)	−0.035	−0.036	−0.032	−0.048	−0.016	−0.013	−0.007	−0.019
	(0.036)	(0.037)	(0.039)	(0.035)	(0.022)	(0.023)	(0.025)	(0.021)
Real GDP growth (2012)	0.197			0.271	0.331**			0.349**
	(0.302)			(0.286)	(0.168)			(0.160)
General Public Debt (2012)		−0.016				−0.011		
		(0.027)				(0.016)		
Fiscal deficit/GDP (2012)			−0.046				−0.104	
			(0.200)				(0.119)	
Size(External financing, (2010-12), Log)	0.156**	0.215***	0.171**	0.154**	−0.001	0.054	0.009	0.001
	(0.066)	(0.073)	(0.078)	(0.066)	(0.039)	(0.047)	(0.051)	(0.039)
Observations	39	39	39	39	38	38	38	38
Residual Std. Error	3.300 (df = 34)	3.943 (df = 34)	3.941 (df = 34)	4.230 (df = 34)	1.750 (df = 33)	1.978 (df = 33)	2.124 (df = 33)	1.776 (df = 33)

Dependent variable:

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Ahmed et al. (2014)

Authors find CAD, Govt. debt and a vulnerability index to be significant

	Dependent variable:							
	% change in exchange rate returns				% change in FW abnormal returns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CAD/GDP (2012)	−0.092				−0.043			
	(0.156)				(0.154)			
Reserves/GDP (2012)	−0.108				−0.072			
	(0.066)				(0.065)			
Short term debt to reserves (2012)	−0.087**				−0.069**			
	(0.033)				(0.033)			
CPI inflation average (2010-12)	0.315*				0.208			
	(0.155)				(0.152)			
Bank credit/GDP 5-year change, 2012	0.075				0.080			
	(0.081)				(0.080)			
Government deficit to GDP (2012)	0.010				0.004			
	(0.042)				(0.041)			
Vulnerability index (2012)		0.190	0.247	0.288		0.091	0.162	0.166
		(0.188)	(0.217)	(0.183)		(0.178)	(0.197)	(0.182)
Market cap to GDP (2011)			0.058**				0.064***	
			(0.025)				(0.023)	
Average annual % change in RER (2010-12)				−0.744**				−0.540*
				(0.296)				(0.295)
Constant	7.515***	0.897	−2.556	−2.782	6.178**	2.013	−1.928	−0.633
	(2.522)	(3.599)	(4.608)	(3.748)	(2.482)	(3.402)	(4.176)	(3.732)
Observations	36	36	31	34	36	36	31	34
R^2	0.255	0.029	0.171	0.190	0.174	0.008	0.221	0.103
Adjusted R^2	0.100	0.001	0.112	0.138	0.003	−0.022	0.165	0.046
Residual Std. Error	5.246 (df = 29)	5.529 (df = 34)	5.462 (df = 28)	5.195 (df = 31)	5.163 (df = 29)	5.226 (df = 34)	4.951 (df = 28)	5.173 (df = 31)

Note: *p<0.1; **p<0.05; ***p<0.01

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Ahmed et al. (2014)

Short term debt to reserves, CPI inflation, Bank credit to GDP are significant using the AFW abnormal returns

	Dependent variable:							
	% change in exchange rate returns				% change in AFW abnormal returns			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CAD/GDP (2012)	−0.092 (0.156)				−0.104 (0.077)			
Reserves/GDP (2012)	−0.108 (0.066)				0.004 (0.033)			
Short term debt to reserves (2012)	−0.087** (0.033)				−0.055*** (0.016)			
CPI inflation average (2010-12)	0.315* (0.155)				0.230*** (0.076)			
Bank credit/GDP 5-year change, 2012	0.075 (0.081)				0.085** (0.040)			
Government deficit to GDP (2012)	0.010 (0.042)				−0.029 (0.021)			
Vulnerability index (2012)		0.190 (0.188)	0.247 (0.217)	0.288 (0.183)		−0.001 (0.100)	−0.017 (0.126)	0.041 (0.103)
Market cap to GDP (2011)			0.058** (0.025)				0.007 (0.014)	
Average annual % change in RER (2010-12)				−0.744** (0.296)				−0.298* (0.166)
Constant	7.515*** (2.522)	0.897 (3.599)	−2.556 (4.608)	−2.782 (3.748)	2.205* (1.248)	0.985 (1.914)	1.017 (2.671)	−0.545 (2.107)
Observations	36	36	31	34	36	36	31	34
R^2	0.255	0.029	0.171	0.190	0.335	0.00000	0.012	0.094
Adjusted R^2	0.100	0.001	0.112	0.138	0.197	−0.029	−0.059	0.035
Residual Std. Error	5.246 (df = 29)	5.529 (df = 34)	5.462 (df = 28)	5.195 (df = 31)	2.596 (df = 29)	2.939 (df = 34)	3.167 (df = 28)	2.920 (df = 31)

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Mishra et al. (2014)

Meeting No.	Date of Meeting	Minutes
1	January 29-30	20-Feb-13
2	March 19-20	10-Apr-13
3	April/May 30-1	22-May-13
4	June 18-19	10-Jul-13
5	July 30-31	21-Aug-13
6	September 17-18	9-Oct-13
7	October 16	
8	October 29-30	20-Nov-13
9	December 17-18	8-Jan-14
Source: Mishra et al. (2014)		

- Authors use 2 day pre-2 day post event date returns in an event dummy regresssion framework to determine negative (depreciation) and positive (appreciation events) on a panel of EMs
- Positive events: Meetings 6, 7 and Minutes 4 and 6
- Negative events: Meetings 4, 8 and Minutes 3, 5 and 7
- We replicate this strategy with friday-friday weekly returns around an event

Mishra et al. (2014)

Only Meeting 2 seems significant!

	Dependent variable:		
	(AFW abnormal returns)	(FW abnormal returns)	(Exchange rate returns)
"meeting1"	0.153	0.347	−0.028
	(0.236)	(0.219)	(0.272)
"meeting2"	0.324**	0.455***	0.879***
	(0.161)	(0.170)	(0.200)
"meeting3"	0.220	−0.041	−0.254
	(0.257)	(0.259)	(0.250)
"meeting4"	0.245	2.015***	2.960***
	(0.245)	(0.323)	(0.359)
"meeting5"	0.096	0.725***	0.968***
	(0.200)	(0.234)	(0.211)
"meeting6"	0.234	−0.837***	−1.309***
	(0.226)	(0.206)	(0.210)
"meeting7"	0.053	0.012	−0.289*
	(0.152)	(0.166)	(0.157)
"meeting8"	0.377	0.592**	1.807***
	(0.268)	(0.290)	(0.356)
"meeting9"	0.003	0.586**	0.995***
	(0.184)	(0.253)	(0.221)

Note: *p<0.1; **p<0.05; ***p<0.01

Mishra et al. (2014)

None of the minute releases seem to have had an impact

	(AFW abrnormal returns)	(FW abnormal returns)	(Exchange rate returns)
	Dependent variable:		
"minutes1"	0.172	−0.214	0.836***
	(0.181)	(0.192)	(0.186)
"minutes2"	0.106	−0.116	−0.375*
	(0.183)	(0.178)	(0.192)
"minutes3"	0.060	0.728***	0.805***
	(0.188)	(0.241)	(0.232)
"minutes4"	0.060	−0.065	−0.697***
	(0.209)	(0.205)	(0.257)
"minutes5"	0.259	0.801**	0.883***
	(0.332)	(0.339)	(0.324)
"minutes6"	0.029	−0.317**	−0.022
	(0.171)	(0.160)	(0.131)
"minutes7"	0.113	0.173	0.203
	(0.210)	(0.204)	(0.173)

Note: $^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$