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Dependence of "Fragile Five" and "Troubled Ten" Emerging Markets' Financial System to US Monetary Policy and Monetary Policy Uncertainty

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Dependence of "Fragile Five" and "Troubled Ten" emerging markets' financial system to US monetary policy and monetary policy uncertainty*

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Abstract

In this study, we aim to measure the dependence between financial markets of certain emerging market countries to the US monetary policy and monetary policy uncertainty. To do so, we apply time-varying copula models proposed by Patton (2006). We are particularly interested in the differences between emerging markets dependence on the US monetary policy, i.e. which country's financial market co-move more or less in response to quantitative easing or quantitative tightening. The results of our study is important as financial risks via contagion became an issue to monitor especially after the subprime crisis of 2008, although this crisis affected the emerging markets relatively less compared to advanced economies. The results of this paper show us that, there exists significant difference between the emerging markets with respect to their dependence to the US monetary policy. The correlation persistence parameters, which control the evolution of time-varying dependence, reveal that especially the emerging countries in the Latin American region are more dependent to both the US monetary policy and the monetary policy uncertainty. In this framework, it is interesting to see that the results acknowledge increasing dependence during the subprime crisis, which decrease after the year 2009, that should be considered as a risk factor for the policy makers that monitor the financial markets of the emerging markets closely.

Keywords: fragile five; troubled ten; financial vulnerability; US monetary policy; time-varying copulas

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Non-Technical Summary

Capital flows from most emerging market countries are vastly affected from the US Fed launching three periods of quantitative easing starting from the end of 2008. Although the impact of the quantitative easing on various macroeconomic indicators such as economic growth, employment and inflation and especially financial indicators have drown considerable academic interest, little is known about the impacts of the unconventional US monetary policy implementations on the vulnerable emerging market economies and their financial markets. Since quantitative easing, which is working through the international portfolio balancing channels, changes the capital flows between countries by adjusting the cross country currencies, it seems reasonable to expect cross correlations between emerging market currencies and asset markets with the US monetary policy and monetary policy uncertainty to get affected. In that respect, the aim of this study is to illustrate the evolution of dependency of emerging market currencies and asset markets to the US monetary policy and monetary policy uncertainty and quantify this dependency via certain methods.

Considering the non-normality of high frequency asset returns, in this study we will use copula methods to measure the dependency of emerging market financial system to the movements of the US monetary policy that is represented by FED policy rates and the US monetary policy uncertainty that is represented by MOVE index. There is a vast literature examining the co-movement between different financial markets or same financial variables of different countries. In addition to that, there also exist studies that analyze the co-movement of FED-policy and financial markets, yet to our common knowledge this paper will be the first to combine the co-movement in a tail dependence sense, i.e. using copulas to analyze the co-movement between the US monetary policy and emerging financial markets. In addition to that, most of the studies that analyze the co-movement between certain financial markets and the US fundamentals conduct the experiment after the 2008 global financial crisis. Our study covers a very long period, starting from 1995, with different regimes of monetary policy applied by the US. It is obvious that the global financial crisis put the spillovers and contagion between financial markets in front of the curtain, yet the emerging markets were always affected from certain fundamentals of the US through capital flows.

Our results reveal the increasing dependency throughout the end of 1990s especially for the far-eastern countries, we can observe the Russian crisis at the beginning of 2000 and other local stressful periods of certain groups of emerging markets. Given the persistence parameter we get via time-varying copulas of Patton (2006), we can clearly observe the heterogeneity among different emerging market countries and differences between the exchange rate and stock markets. One surprising result is that many of the emerging market countries indeed is not that dependent to the US monetary policy and monetary policy uncertainty compared to pre-subprime crisis period. The factors accounting for the dependency and the persistence of dependency deserves further exploration yet we could definitely state that it is not all doom and gloom for the “Fragile” and “Troubled” group.

1 Introduction

"Fragile Five" is a term created in August of 2013 by a research analyst at Morgan Stanley to represent emerging market economies that have become too dependent on unstable foreign investment to finance their growth prospects. The original five members of the fragile group include Turkey, Brazil, India, South Africa and Indonesia. In 2015, these countries experienced ongoing problems as capital flows out of emerging markets and into developed countries. Through contagion channels, these problems affected other emerging markets and "Fragile Five" has been expanded by Morgan Stanley analysts to "Troubled Ten" in mid-2015 in response to capital moving out of these emerging market countries. The "Troubled Ten" economies include Taiwan, Singapore, Russia, Thailand, South Korea, Peru, South Africa, Chile, Colombia and Brazil.

Capital flows from most emerging market countries are vastly affected from the US Fed launching three periods of quantitative easing starting from the end of 2008. Although the impacts of the quantitative easing on various macroeconomic indicators such as economic growth, employment and inflation and especially financial indicators have drown considerable academic interest, little is known about the impacts of the unconventional US monetary policy implementations on the vulnerable emerging market economies and their financial markets. Since quantitative easing, which is working through the international portfolio balancing channels, changes the capital flows between countries by adjusting the cross country currencies, it seems reasonable to expect cross correlations between emerging market currencies and asset markets with the US monetary policy and monetary policy uncertainty to get affected. In that respect, the aim of this study is to illustrate the evolution of dependency of emerging market currencies and asset markets to the US monetary policy and monetary policy uncertainty and quantify this dependency via certain methods.

In asset pricing theory (APT), multivariate financial returns are often assumed to be normally distributed in order to draw simple results, but in practice this assumption does not hold especially for high frequency data (weekly and daily).[1] Financial returns are found to be leptokurtic and they also show skewness in univariate distributions.[2] There exist considerable amount of literature concerning the characteristics of asset returns, which seem to suggest that the return generating process might be non-linear, non-normal and that the returns might be mutually dependent. This possible dependency does not necessarily imply market efficiency, as long as the return generating process can be represented as a martingale that would satisfy the condition of efficiency. Therefore, it is necessary to find a different approach to model the multivariate distributions of high frequency asset returns and in addition to that modern risk management requires an understanding of dependence that goes beyond simple linear correlation.[3]

Considering the non-normality of high frequency asset returns, in this study we will use cop-

[1] See Sancetta and Satchell (2001) and Sancetta and Satchell (2004) for details.

[2] Mandelbrot (1963) and Fama (1965) were the first ones who reported the fundamental differences from the normality assumption of returns, i.e. they claim that the empirical return distributions are fat-tailed and peaked when compared to normal distribution.

[3] Throughout, we use the word dependence to represent copulas. We would like to express this because there are numerous words in use, i.e. correlation, concordence, co-dependency and etc. We do not assume that any dependence measure is ideal, and throughout we indicate advantages and disadvantages whenever the case may be.

ula methods to measure the dependency of emerging market financial system to the movements of the US monetary policy that is represented by FED policy rates and the US monetary policy uncertainty that is represented by MOVE index. The conventional Pearson correlation is not inappropriate when it comes to measuring the dependence across financial markets since it gives an equal weight to both positive and negative returns as well as large and small realizations. It may also lead to a significant underestimation of the risk from joint extreme events. Therefore we will use methods that will help us measure the dependence asymmetrically. In this respect, we aim to quantify the dependency of emerging market countries', which are included in "Fragile Five" and "Troubled Ten", exchange rates and equity markets to the US monetary policy and monetary policy uncertainty using daily data starting from the beginning of January 1995 till the end of the beginning of March 2017.

There is a vast literature examining the co-movement between different financial markets or same financial variables of different countries. In addition to that, there also exist studies that analyze the co-movement of FED-policy and financial markets, yet to our common knowledge this paper will be the first to combine the co-movement in a tail dependence sense, i.e. using copulas to analyze the co-movement between the US monetary policy and emerging financial markets. Recent studies that delve into the area of co-movement between global financial markets and the US monetary policy include a study by Aizenman et al. (2016) illustrating that emerging market countries with more robust fundamentals were more adversely affected by tapering news than the fragile group. Another study by Ozmen and Yilmaz (2016) reveal that the co-movement between exchange rates with FED policy changes over frequencies and across time. Kryzanowski et al. (2017) examine the correlations between bond markets, stock markets and currency forwards during the three distinct quantitative easing programs launched by the US Federal Reserve and find that the correlations differ between various asset markets.

Accordingly, in this study we examine the dependence between exchange rates and stock markets of certain emerging markets and the US monetary policy. The difference of our study from the previous literature is its method to build up the dependence through copulas, as we would like to observe how the co-movement evolves over time. In addition to that, most of the studies that analyze the co-movement between certain financial markets and the US fundamentals conduct the experiment after the 2008 global financial crisis. Our study covers a very long period with different regimes of monetary policy applied by the US. It is obvious that the global financial crisis put the spillovers and contagion between financial markets in front of the curtain , the emerging markets were always affected from the certain fundamentals of US through capital flows. It is because of that reason our study starts from the beginning of 1995.

In the first step of this study, we will examine how the emerging market currencies co-move with the US monetary policy and monetary policy uncertainty uncertainty. In this respect we would like to see whether the quantitative easing periods affect the exchange rates after the 2008 global financial crisis. For the second step of the paper, we would like to examine will be the stock market of the emerging markets and whether there exist a significant co-movement with stock markets that we will proxy using Morgan Stanley Capital International (MSCI) indices.

Our paper proceeds as follows: Section 2 introduces the variables, defines data sources and lists descriptive statistics related to the dataset we utilize. Section 3 discusses the copulas that we will employ to measure and quantify the dependency of related financial markets of the emerging markets in question to the US monetary policy and monetary policy uncertainty. Section 4 illustrates the results of the models we employ in the previous section and discusses whether there exist significant dependency patterns between the US monetary policy and the emerging financial markets. The last section concludes.

2 Data

We study the empirical dependence of certain emerging market countries financial markets to the US monetary policy and monetary policy uncertainty. The set of emerging markets considered here are Brazil, Chile, Colombia, Indonesia, India, South Korea, Peru, Russia, Singapore, Thailand, Turkey, Taiwan and South Africa. There is a reason why these countries are chosen as a sample, i.e. their economies are too dependent on capital flows and whenever the global capital finds a safe haven, the first countries it leaves are those set of emerging market countries. That is why some of those countries are named "Fragile Five" and "Troubled Ten". Through capital moving in and out of these countries, the financial markets of these countries becomes dependent on advanced economies monetary policy and monetary policy uncertainty. We use daily data of MSCI stock indices and nominal exchange rates of emerging market countries. Daily Federal Reserve effective funds rate is used as the US monetary policy measure and we use Merrill Lynch Option Volatility Estimate (MOVE) index as a proxy for the US monetary policy uncertainty. MOVE index is derived from a yield curve weighted index of the normalized implied volatility on one month treasury options that are weighted on the two, five, 10 and 30 year contract.

Table 1 lists the variables and the abbreviation that we will use throughout the methodology section, the transformation we applied on the data and the definitions. Table 2a and Table 2b outlines the descriptive statistics of the emerging markets exchange rates and stock market indices. All the nominal currencies we use are against the US dollars and an increase (decrease) means an appreciation (depreciation) in the emerging economies' currency. We collect data from Bloomberg and we choose to go back as far as possible to observe the evolution of dependence between emerging markets financial variables and the US monetary policy. Accordingly, our data starts from first of January 1995 and ends at the end of February 2017.[4]

[4]We use 5535 sample points of daily data and the availability is restricted by the MSCI index of Russia.

Table 1: Definition of variables and data source

Variable	Transformation	Definition	Frequency	Source
$FED-DFF$	Difference	Effective Federal Funds Rate	Daily	FRED Economic Data
$MOVE$	Log-difference	Merrill lynch Option Volatility Estimate IndexÂ	Daily	Bloomberg
$XR-BRL$	Log-difference	Brazilian Real/USD Exchange Rate	Daily	Bloomberg
$XR-CLP$	Log-difference	Chilian Peso/USD	Daily	Bloomberg
$XR-COP$	Log-difference	Colombian Peso	Daily	Bloomberg
$XR-IDR$	Log-difference	Indonesian Rupiah	Daily	Bloomberg
$XR-INR$	Log-difference	Indian Rupea	Daily	Bloomberg
$XR-KRW$	Log-difference	South Korean Won	Daily	Bloomberg
$XR-PEN$	Log-difference	Peruvian Sol	Daily	Bloomberg
$XR-RUB$	Log-difference	Russian Ruble	Daily	Bloomberg
$XR-SGD$	Log-difference	Singapore Dollar	Daily	Bloomberg
$XR-THB$	Log-difference	Thai Baht	Daily	Bloomberg
$XR-TRL$	Log-difference	Turkish Lira	Daily	Bloomberg
$XR-TWD$	Log-difference	Taiwanese Dollar	Daily	Bloomberg
$XR-ZAR$	Log-difference	South African Rand	Daily	Bloomberg
$MSCI-BRL$	Log-difference	MSCI of Brazil	Daily	Bloomberg
$MSCI-CLP$	Log-difference	MSCI of Chilea	Daily	Bloomberg
$MSCI-COP$	Log-difference	MSCI of Colombia	Daily	Bloomberg
$MSCI-IDR$	Log-difference	MSCI of Indonesia	Daily	Bloomberg
$MSCI-INR$	Log-difference	MSCI of India	Daily	Bloomberg
$MSCI-KRW$	Log-difference	MSCI of South Korea	Daily	Bloomberg
$MSCI-PEN$	Log-difference	MSCI of Peru	Daily	Bloomberg
$MSCI-RUB$	Log-difference	MSCI of Russia	Daily	Bloomberg
$MSCI-SGD$	Log-difference	MSCI of Singapore	Daily	Bloomberg
$MSCI-THB$	Log-difference	MSCI of Thailand	Daily	Bloomberg
$MSCI-TRL$	Log-difference	MSCI of Turkey	Daily	Bloomberg
$MSCI-TWD$	Log-difference	MSCI of Taiwan	Daily	Bloomberg
$MSCI-ZAR$	Log-difference	MSCI of South Africa	Daily	Bloomberg

A close inspection of Table 2a and 2b shows that average returns are approximately zero in all of the countries, whereas differences in standard deviations indicate dispersion in volatility behaviour across markets. Likewise, large differences between maximum and minimum returns show that the price ranges are greater for Russia and Indonesia especially compared to other emerging markets. Kurtosis statistics are high most of the time nearly for all the returns , consistent withe the fat tail hypothesis for the return distributions.

Table 2a: Summary statistics of the daily log returns of exchange rates and the US monetary policy variables

	FED-DFF	*MOVE*	*XR-BRL*	*XR-CLP*	*XR-COP*	*XR-IDR*	*XR-INR*	*XR-KRW*	*XR-PEN*	*XR-RUB*	*XR-SGD*	*XR-THB*	*XR-TRL*	*XR-TWD*	*XR-ZAR*
Mean	-0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	0.000	0.000	-0.001	0.000	0.000
Median	0.000	-0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	2.800	0.337	0.103	0.042	0.076	0.231	0.035	0.203	0.036	0.278	0.037	0.086	0.083	0.032	0.116
Minimum	-2.510	-0.355	-0.087	-0.045	-0.068	-0.200	-0.033	-0.153	-0.030	-0.259	-0.030	-0.178	-0.314	-0.033	-0.155
Std. Deviation	0.150	0.041	0.010	0.006	0.007	0.015	0.004	0.009	0.003	0.014	0.004	0.006	0.010	0.003	0.011
Skewness	1.078	0.558	-0.165	-0.232	-0.116	-0.327	-0.291	-0.211	0.128	-1.768	0.166	-3.689	-6.036	-0.353	-0.771
Kurtosis	62.631	9.149	15.786	7.693	14.037	70.970	11.906	89.554	20.810	175.078	11.387	136.114	168.115	17.322	18.031
Jarque-Bera	821131	9008	37729	5129	28105	1065579	18369	1727782	73167	6831895	16248	4099047	6321144	47422	52655
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: Jarque-Bera corresponds to Jarque-Bera test statistics with p-values in parentheses.

As a result, the normality assumption is rejected for all the returns by the Jarque-Bera statistics.

Table 2b: Summary statistics of the daily log returns of MSCI indices

	MSCI-BRL	*MSCI-CLP*	*MSCI-COP*	*MSCI-IDR*	*MSCI-INR*	*MSCI-KRW*	*MSCI-PEN*	*MSCI-RUB*	*MSCI-SGD*	*MSCI-THB*	*MSCI-TRL*	*MSCI-TWD*	*MSCI-ZAR*
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Median	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Maximum	0.226	0.221	0.165	0.168	0.164	0.117	0.145	0.242	0.110	0.214	0.178	0.092	0.068
Minimum	-0.183	-0.116	-0.130	-0.191	-0.155	-0.142	-0.165	-0.310	-0.098	-0.181	-0.197	-0.103	-0.122
Std. Deviation	0.024	0.013	0.016	0.019	0.016	0.019	0.018	0.030	0.013	0.018	0.024	0.015	0.013
Skewness	-0.010	0.358	-0.085	-0.144	-0.278	0.009	-0.189	-0.413	0.017	0.659	0.046	-0.037	-0.336
Kurtosis	10.993	21.661	11.718	12.641	11.098	8.607	10.470	14.716	9.741	15.450	9.191	6.300	7.763
Jarque-Bera	14736	80428	17533	21454	15193	7252	12903	31816	10479	36150	8842	2513	5336
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: Jarque-Bera corresponds to Jarque-Bera test statistics with p-values in parentheses.

3 Dependence with Copulas

A theorem of Sklar (1959) introduced the copula functions that are becoming more popular in financial, macroeconomic and even agricultural research. According to the theorem of Sklar, it is possible to decompose and n-dimensional joint distribution function into its n marginal distributions and a copula, where the latter completely describes the dependence amongst the variables. This type of decomposition allows for more flexibility in the construction for multivariate distributions, which explains the major role that copulas have played in multivariate modelling lately.

Since copulas represent the dependence structure between random variables, they provide a natural way of studying and measuring the dependence amongst these variables. In addition, copula-based measures of dependence have the desirable property of invariance under strictly increasing transformations.[5] In particular, the tail dependence, which is considered to be a copula based measure, indicates the dependence in extreme values. The concept of tail dependence became an interest to risk management practitioners especially after the subprime crisis.

Patton (2006) extended Sklars' theorem to conditional case, defining the conditional copula and rendered the dependence parameter conditional and time-varying. Allowing for time-variation in the conditional dependence among economic time series seems natural since time variation in the conditional mean and variance of such series have been widely reported. For this reason, the extension of Sklars' theorem to the conditional case has proved to be very useful. Patton extended Sklars' theorem as follows:

Theorem *(Sklars' Theorem - two dimensional conditional case) Let F_1 be the conditional distribution of $X_1|W$, F_2 be the conditional distribution of $X_2|W$, and H be the joint conditional distributions of $(X_1X_2)|W$, where W is the conditioning variable with support Ω. For exposition purposes, it is assumed that W has dimension 1. Then there exists a conditional copula $\mathcal{C}$ such that, for any $(x_1, x_2) \in \overline{\mathbb{R}}^2$ and each $w \in \Omega$,*

$$H(x_1, x_2|w) = \mathcal{C}(F_1(x_1|w), F_2(x_2|w)) \tag{1}$$

If F_1 and F_2 are continuous, then $\mathcal{C}$ is unique; otherwise, it is uniquely determined on $\mathrm{Ran}F_1 \times \mathrm{Ran}F_2$. *Conversely, if we let F_1 be the conditional distribution of $X_1|W$, F_2 be the conditional distribution of $X_2|W$, and $\mathcal{C}$ be the conditional copula, then the function H as defined above is a conditional bivariate distribution function with conditional marginal distributions F_1 and F_2.*

It is clear from the above theorem that copulas are functions that bind the multivariate

[5] See Nelsen (2007) for more details.

distributions to their marginal distributions. They contain all information from the joint distribution that is not contained in the marginal distributions, which means that they contain all the information on the dependence among the variables. Is is for this reason that copulas are alternatively called "dependence functions". According to Patton, it is the converse of the Sklars' theorem that is more interesting for multivariate modelling, since it implies that we may link any univariate distribution to any copula and through this link a valid multivariate distribution will be defined.

The conditional density function corresponding top the distribution function in equation 1 can be easily recovered, provided that F_1 and F_2 are differentiable and H and $\mathcal{C}$ are twice differentiable:

$$\begin{aligned} h(x_1, x_2|w) &\equiv \frac{\partial^2 H(x_1, x_2|w)}{\partial x_1 \partial x_2} \\ &= \frac{\partial F_1(x_1|w)}{\partial x_1} \cdot \frac{\partial F_2(x_2|w)}{\partial x_2} \cdot \frac{\partial^2 \mathcal{C}(F_1(x_1|w), F_2(x_2|w)|w)}{\partial u_1 \partial u_2} \\ &= f_1(x_1|w) \cdot f_2(x_2|w) \cdot c(u_1, u_2|w) \end{aligned} \tag{2}$$

where $u_1 = F_1(x_1|w)$ and $u_2 = F_2(x_2|w)$. This result is particularly useful for the maximum likelihood estimation that we will use for the results of copulas.

Patton (2006) allows for time variation in the conditional copula by assuming that the dependence parameter, θ_c, evolves through time according to an equation that follows a kind of restricted ARMA(1,10) process, with an autoregressive component, to capture any persistence in the dependence parameter, and a forcing variable to capture any variation in dependence. The evolution equation of the dependence parameter can be written as:

$$\theta_{ct} = \Lambda(\omega + \beta\theta_{ct-1} + \alpha\psi_t)$$

where Λ is a logistic transformation used to keep the parameter in its interval at all times and ψ_t is the forcing variable, defined by Patton as the mean absolute difference between the transformed marginals u_{1t} and u_{2t} over the past ten observations.

We would like to discuss several advantages and disadvantages of using copulas in finance. First, copulas are convenient choice for potentially nonlinear portfolio dependence. Second, copulas permit one to model joint dependence in a portfolio without specifying the distribution of individual assets in the portfolio. Third, the copula is invariant under strictly increasing transforms. On the other hand there are two disadvantages of using copulas. First existing financial models of asset prices are typically expressed in terms of Pearson correlation. Therefore, if a study uses copulas that do not have correlation as a parameter, it is difficult to relate the results to those financial models used in the empirical literature. Second, from a statistical perspective it is not easy to say which parametric copula best fits the data.

In this study we use the following copulas to analyze the dependence between the financial markets of emerging markets to the US monetary policy decisions:[6] the elliptical copula, i.e. Normal copula, and two Archimedean copulas, namely Rotated-Gumbel and Symmetrized Joe-Clayton (SJC) copula.[7] The Normal copula is the most popular one used in the financial

[6]The copula models were estimated using the Copula Toolbox provided by Andrew Patton and some functions written by the authors for the Matlab software.

[7]Their functional forms as well as the evolution equations of their dependence parameters following Patton (2006) are described in the Appendix A.

literature due to its easy computation of the linear correlation coefficient and the dependence structure. In addition to its easy computation, some basic theories in finance are based on linear correlation between different instruments. A drawback regarding the Normal copula is that, it describes only symmetric dependence, and it has been widely reported in literature that asymmetries are expected in financial returns. Asymmetry in returns in this framework is that dependence in lower tail can be larger than dependence in upper tail and vice versa. For this reason alone, we adopted two asymmetric copulas, i.e. SJC copula with lower tail dependence different from upper tail dependence and Rotated-Gumbel copula with only lower tail dependence.

Economically speaking, when risk distributions are moderately heavy tailed, this represents potentially unbounded downside risk and upside gain. In such a situation, some investors might wish to invest in several asset classes, even though this contributes to an increased fragility of the entire financial system. In an environment of heavy tailed risk distributions economists and investors often assess diversification benefits using a measure of dependence. Therefore the measure of dependence is extremely important from a risk management, policy and broad economic perspective. Embrechts et al. (2002) introduce copulas into risk management, and the authors show that standard Pearson correlations can go dangerously wrong as a risk measure.

4 Results and Discussion

We estimate static and time-varying versions of bivariate copula models for the variables reported in Table 1. The results are reported in Table 3-6 and we select the best copula model based on the maximum log likelihood.[8]

Table 3 reports estimates for the FED effective fund rate and exchange rate returns pairs. The evolution of the dependence between pairs as a graph is illustrated in Appendix B. The empirical evidence indicate that there exist significant dependence between the US monetary policy and the exchange rate returns of emerging market countries that we study.[9] Table 3 shows us that, form eight countries time-varying normal copula perform better that the asymmetric Rotated-Gumbel copula. For Indonesia, Peru, Russia, Singapore and Taiwan asymmetric tail dependence with lower tail dependence and no upper tail dependence was observed.[10] Lower tail dependence for these countries mean extreme monetary policy easing (decreasing funds rate) were accompanied by local currency depreciations in emerging markets.

[8] Since our estimation sample is very long, the information criteria AIC and BIC choose the same models as loglikelihood, therefore we do not present the information criteria results here.

[9] We compare the static copula AIC and BIC with time-varying copulas' AIC and BIC. For every pair, time varying copulas perform better, so we choose not to report the result of static copulas in the paper.

[10] We do not report the Symmetrized Joe-Clayton copula results and loglikelihoods as there does not exist one case that it performs better than other two time-varying copulas.

Table 3: Results of Time-varying Normal and Rotated-Gumbel Copula (Depence between FED-DFF and XRs)

	Normal Copula				Rotated-Gumbel Copula			
	ω_N	β_N	α_N	LL	ω_{RG}	β_{RG}	α_{RG}	LL
$XR-BRL$	**-0.024**	**-0.100**	**0.851**	-4.061	**0.934**	**-1.249**	**0.803**	-0.942
	(0.000)	(0.001)	(0.007)		(0.009)	(0.008)	(0.004)	
$XR-CLP$	**-0.006**	**-0.084**	**0.601**	-1.425	**2.211**	**-2.406**	**0.595**	-0.613
	(0.000)	(0.001)	(0.012)		(0.000)	(0.000)	(0.000)	
$XR-COP$	**-0.047**	**-0.191**	**-1.990**	-4.439	**-1.043**	**1.371**	**-0.927**	-3.363
	(0.000)	(0.001)	(0.000)		(0.000)	(0.000)	(0.000)	
$XR-IDR$	**-0.042**	**-0.039**	**-0.848**	-0.744	**-0.045**	**0.632**	**-1.425**	-18.523
	(0.001)	(0.001)	(0.044)		(0.001)	(0.001)	(0.002)	
$XR-INR$	**-0.016**	**-0.017**	**1.253**	-1.387	**0.963**	**-0.765**	**-0.529**	-0.503
	(0.000)	(0.000)	(0.011)		(0.005)	(0.004)	(0.004)	
$XR-KRW$	**-0.071**	**-0.259**	**-1.212**	-6.951	**-0.620**	**1.029**	**-1.107**	-6.779
	(0.000)	(0.001)	(0.005)		(0.000)	(0.000)	(0.000)	
$XR-PEN$	**0.002**	**-0.016**	**1.617**	-0.755	0.015	**0.425**	**-1.115**	-4.394
	(0.000)	(0.000)	(0.013)		(0.011)	(0.010)	(0.003)	
$XR-RUB$	**0.003**	**-0.033**	**-0.140**	-0.155	**1.903**	**-1.608**	**-0.735**	-5.265
	(0.000)	(0.001)	(0.018)		(0.000)	(0.001)	(0.002)	
$XR-SGD$	**-0.012**	**-0.018**	**0.385**	-0.231	**-1.160**	**1.417**	**-0.749**	-1.189
	(0.000)	(0.001)	(0.032)		(0.012)	(0.010)	(0.004)	
$XR-THB$	**-0.086**	**-0.162**	**-0.646**	-5.580	**-0.903**	**1.208**	**-0.898**	-1.983
	(0.000)	(0.001)	(0.008)		(0.012)	(0.010)	(0.004)	
$XR-TRL$	**-0.067**	**-0.039**	0.000	-2.945	-0.009	0.013	-0.008	0.038
	(0.013)	(0.001)	(0.013)		(0.043)	(0.044)	(0.018)	
$XR-TWD$	**-0.001**	**-0.082**	**-0.282**	-0.695	**-0.846**	**1.202**	**-1.017**	-1.515
	(0.000)	(0.001)	(0.021)		(0.009)	(0.008)	(0.004)	
$XR-ZAR$	**-0.102**	**0.058**	**-1.225**	-3.252	-0.131	0.158	**-0.078**	0.134
	(0.001)	(0.001)	(0.014)		(0.065)	(0.069)	(0.014)	

Note: Standard errors in parentheses. Bold cells are statistically significant at 5% level. The notation here is as presented in Section 3 and Appendix A. LL is the log likelihood.

Table 5 reports estimates for the US monetary policy uncertainty proxied by the MOVE index and exchange rate returns pairs. The evolution of the dependence between pairs as a graph is illustrated in Appendix D. The empirical evidence indicate that there exist significant dependence between the US monetary policy uncertainty implied by the MOVE index and the exchange rate returns of emerging market countries that we study. Interestingly, we find out that Rotated-Gumbel copula is a better fit nearly all the pairs in this category. Again, decreasing monetary policy uncertainty related to US will lead to currency depreciations in most of the emerging countries, which is reasonable as the capital will flow back to US with the decreasing bond volatilities.

Table 4: Results of Time-varying Normal and Rotated-Gumbel Copula (Depence between FED-DFF and MSCIs)

	Normal Copula				Rotated-Gumbel Copula			
	ω_N	β_N	α_N	LL	ω_{RG}	β_{RG}	α_{RG}	LL
$MSCI-BRL$	**-0.010**	**-0.021**	**1.776**	-6.091	**0.425**	**-0.865**	**1.037**	-4.968
	(0.000)	(0.000)	(0.002)		(0.003)	(0.002)	(0.003)	
$MSCI-CLP$	**-0.033**	**-0.095**	**0.725**	-4.573	**-1.095**	**1.389**	**-0.810**	-1.819
	(0.000)	(0.001)	(0.009)		(0.009)	(0.008)	(0.003)	
$MSCI-COP$	**-0.003**	**-0.277**	**-1.091**	-6.824	**0.396**	**-0.204**	**-0.675**	-3.132
	(0.001)	(0.001)	(0.011)		(0.006)	(0.006)	(0.004)	
$MSCI-IDR$	**-0.009**	**-0.021**	**1.715**	-4.018	**-0.176**	**0.709**	**-1.369**	-10.960
	(0.000)	(0.000)	(0.003)		(0.002)	(0.002)	(0.002)	
$MSCI-INR$	**-0.064**	**-0.005**	0.000	-2.807	**0.083**	**-0.633**	**1.269**	-15.114
	(0.001)	(0.001)	(0.013)		(0.001)	(0.001)	(0.002)	
$MSCI-KRW$	**-0.056**	**-0.059**	**-1.852**	-1.246	**-0.100**	**-0.561**	**1.560**	-34.714
	(0.000)	(0.000)	(0.004)		(0.001)	(0.000)	(0.002)	
$MSCI-PEN$	**-0.018**	**-0.024**	**1.424**	-3.071	**2.468**	**-2.381**	**-0.262**	-0.230
	(0.000)	(0.000)	(0.011)		(0.007)	(0.007)	(0.004)	
$MSCI-RUB$	**-0.023**	**-0.185**	**-2.007**	-5.273	**0.093**	**0.574**	**-1.685**	-23.272
	(0.000)	(0.001)	(0.000)		(0.001)	(0.001)	(0.002)	
$MSCI-SGD$	**-0.081**	**-0.036**	**-0.624**	-2.636	**-0.096**	**-0.552**	**1.487**	-28.760
	(0.001)	(0.001)	(0.033)		(0.000)	(0.000)	(0.001)	
$MSCI-THB$	**-0.120**	**-0.138**	**-0.170**	-10.011	**0.006**	**0.611**	**-1.511**	-22.255
	(0.001)	(0.001)	(0.012)		(0.001)	(0.001)	(0.002)	
$MSCI-TRL$	**-0.067**	**-0.043**	**-1.432**	-1.128	**0.009**	**-0.619**	**1.424**	-27.923
	(0.001)	(0.001)	(0.010)		(0.001)	(0.001)	(0.002)	
$MSCI-TWD$	**-0.001**	**-0.012**	**1.868**	-1.786	**-0.124**	**-0.539**	**1.547**	-16.613
	(0.000)	(0.000)	(0.001)		(0.000)	(0.000)	(0.000)	
$MSCI-ZAR$	**-0.034**	**-0.146**	**-1.848**	-2.250	**0.160**	**-0.723**	**1.482**	-4.276
	(0.001)	(0.001)	(0.002)		(0.000)	(0.000)	(0.000)	

Note: Standard errors in parentheses. Bold cells are statistically significant at 5% level. The notation here is as presented in Section 3 and Appendix A. LL is the log likelihood.

When we examine the graphs illustrated in Appendix B and Appendix D, we can clearly observe the times that the dependency between exchange rate and the monetary policy of the US. Surprisingly, nearly for all the countries the relationship between the exchange rates and monetary policy of US weakens after the global financial crisis of 2008. The dependence slightly picks up towards the end of the sample period. This result is more strong for the co-movement between the US monetary policy uncertainty and the exchange rates of the emerging market countries. With the exception of Indonesia, which exhibits a strong response to the US monetary policy uncertainty, the dependence evolves nearly to zero levels of approximation. The decrease in dependence is especially very observable over the time for Turkey. In a way, we can state that most of the emerging market countries experiencing different local currency shocks in the 1990s and at the beginning of 2000s eventually learned to deal with shocks and spillovers coming form the advanced economies. After the final global crisis of 2008, nearly all the emerging countries tackled their exchange rate markets more professionally.

Our results that are related to the dependence between the US monetary policy and the exchange rate markets of the emerging countries are very similar to a study by Ozmen and Yilmaz (2016) who claim that the relation between the exchange rate and interest rate differentials vanishes over the 2009-2013 period. [11]

Next, we will examine the relationship between the US monetary policy and monetary

[11] See Ozmen and Yilmaz (2016) for more details.

policy uncertainty and the stock market return pairs of the emerging market countries. As can be observed from Table 4 and Table 6, we find significant dependence between the stock markets of the countries in question and the US monetary policy, yet this dependence is symmetric at all times according to our estimated copula results. Indeed, we get very bad loglikelihood results with respect to Rotated-Gumbel and SJC copula. The evolution of the dependence for the pairs are illustrated in Appendix C and Appendix E. Appendix C shows us that, with the exception of Russia, the dependence between the emerging country stock markets and US monetary policy decreases significantly especially after the global financial crisis period.

Table 5: Results of Time-varying Normal and Rotated-Gumbel Copula (Depence between MOVE and XRs)

	Normal Copula				Rotated-Gumbel Copula			
	ω_N	β_N	α_N	LL	ω_{RG}	β_{RG}	α_{RG}	LL
$XR-BRL$	-0.002	**0.013**	**1.979**	-44.432	**0.852**	**-0.853**	0.001	0.063
	(0.003)	(0.002)	(0.025)		(0.005)	(0.004)	(0.004)	
$XR-CLP$	**-0.039**	**0.028**	**1.681**	-51.727	**0.831**	**-0.831**	0.000	0.320
	(0.001)	(0.000)	(0.006)		(0.004)	(0.004)	(0.002)	
$XR-COP$	**-0.086**	**0.112**	**1.134**	-55.206	**0.867**	**-0.867**	-0.001	0.199
	(0.001)	(0.001)	(0.012)		(0.005)	(0.004)	(0.003)	
$XR-IDR$	**-0.253**	**-0.012**	**-0.658**	-24.586	**0.868**	**-0.868**	0.001	0.007
	(0.009)	(0.001)	(0.091)		(0.005)	(0.005)	(0.004)	
$XR-INR$	**0.000**	**0.007**	**1.993**	-16.095	**0.831**	**-0.830**	-0.003	0.074
	(0.000)	(0.000)	(0.000)		(0.006)	(0.005)	(0.004)	
$XR-KRW$	**-0.249**	**0.176**	**-1.374**	-20.709	**0.841**	**-0.842**	0.002	0.011
	(0.001)	(0.001)	(0.008)		(0.006)	(0.006)	(0.011)	
$XR-PEN$	**-0.002**	**0.007**	**1.979**	-25.636	**0.827**	**-0.826**	-0.004	0.132
	(0.000)	(0.000)	(0.000)		(0.005)	(0.005)	(0.004)	
$XR-RUB$	**-0.003**	**0.025**	**1.921**	-25.614	**2.234**	**-2.399**	**0.394**	-0.012
	(0.000)	(0.000)	(0.001)		(0.011)	(0.010)	(0.002)	
$XR-SGD$	**-0.175**	**0.378**	**-1.262**	-20.669	**0.318**	**-0.554**	**0.533**	-0.764
	(0.001)	(0.001)	(0.006)		(0.006)	(0.005)	(0.004)	
$XR-THB$	**-0.004**	**0.021**	**1.899**	-14.147	**0.849**	**-0.848**	-0.002	0.132
	(0.000)	(0.000)	(0.001)		(0.007)	(0.006)	(0.007)	
$XR-TRL$	**0.000**	**0.011**	**2.001**	-46.331	**0.844**	**-0.844**	0.000	0.039
	(0.000)	(0.000)	(0.000)		(0.005)	(0.005)	(0.003)	
$XR-TWD$	**-0.009**	**0.044**	**1.744**	-13.760	**0.796**	**-0.795**	-0.002	0.032
	(0.000)	(0.000)	(0.003)		(0.009)	(0.006)	(0.008)	
$XR-ZAR$	**-0.023**	**0.024**	**1.802**	-50.241	**0.835**	**-0.836**	0.002	0.125
	(0.000)	(0.000)	(0.003)		(0.004)	(0.005)	(0.007)	

Note: Standard errors in parentheses. Bold cells are statistically significant at 5% level. The notation here is as presented in Section 3 and Appendix A. LL is the log likelihood.

In most of the studies, it is argued that quantitative easing led the US dollar to be the funding currency in large scale carry trade activity with emerging markets as the target currencies. [12] Large capital outflows could create disruptions in financial markets and eventually real economic activity in emerging markets. However, as can be observed from the evolution of the dependence between both the US monetary policy and monetary policy uncertainty the dependence of emerging markets stock markets weakened after the sub-prime crisis. Maybe this is due to some capital controls applied by the emerging markets to eliminate the harmful effects of capital inflows on the growth of their countries.

[12] Ahmed and Zlate (2014) andAizenman et al. (2016) claim that an important feature of quantitative easing and unprecedentedly low US interest rates is that it led to large short-term capital inflows to a number of emerging markets, which in turn led several to impose capital controls, such as Brazil, Indonesia, South Korea and others.

Table 6: Results of Time-varying Normal and Rotated-Gumbel Copula (Depence between MOVE and MSCIs)

$MSCI-BRL$	**-0.128**	**0.046**	**1.164**	-77.533	**0.827**	**-0.828**	0.002	0.470
	(0.002)	(0.001)	(0.012)		(0.004)	(0.004)	(0.003)	
$MSCI-CLP$	**-0.295**	**0.184**	**-0.380**	-64.485	**0.844**	**-0.845**	0.000	0.379
	(0.001)	(0.001)	(0.012)		(0.004)	(0.004)	(0.002)	
$MSCI-COP$	**-0.419**	**0.247**	**-2.023**	-44.625	**0.857**	**-0.831**	**-0.067**	-0.182
	(0.001)	(0.001)	(0.000)		(0.004)	(0.005)	(0.007)	
$MSCI-IDR$	**-0.016**	**0.007**	**1.734**	-10.301	**0.762**	**-0.812**	**0.141**	-0.071
	(0.000)	(0.000)	(0.006)		(0.006)	(0.006)	(0.010)	
$MSCI-INR$	**-0.011**	**0.015**	**1.807**	-11.885	**0.815**	**-0.813**	-0.005	0.179
	(0.000)	(0.000)	(0.002)		(0.005)	(0.005)	(0.005)	
$MSCI-KRW$	**-0.015**	**0.026**	**1.740**	-16.999	**0.828**	**-0.891**	**0.179**	0.288
	(0.000)	(0.000)	(0.002)		(0.006)	(0.005)	(0.006)	
$MSCI-PEN$	**-0.234**	**0.134**	-0.015	-51.884	**0.843**	**-0.842**	-0.002	0.316
	(0.003)	(0.001)	(0.021)		(0.004)	(0.004)	(0.003)	
$MSCI-RUB$	**-0.291**	**0.168**	**-0.385**	-57.953	**0.864**	**-0.864**	0.000	0.103
	(0.003)	(0.001)	(0.021)		(0.005)	(0.004)	(0.004)	
$MSCI-SGD$	**-0.007**	**0.012**	**1.912**	-22.567	**0.818**	**-0.819**	0.002	-0.012
	(0.000)	(0.000)	(0.001)		(0.005)	(0.005)	(0.004)	
$MSCI-THB$	**-0.018**	**0.011**	**1.742**	-14.689	**0.800**	**-0.800**	0.000	0.002
	(0.000)	(0.000)	(0.005)		(0.006)	(0.005)	(0.005)	
$MSCI-TRL$	**-0.193**	**0.177**	**-0.622**	-23.013	**0.834**	**-0.833**	-0.004	-0.019
	(0.001)	(0.001)	(0.013)		(0.005)	(0.004)	(0.004)	
$MSCI-TWD$	**-0.200**	**0.125**	**-1.391**	-12.031	**0.740**	**-0.654**	**-0.268**	-0.294
	(0.001)	(0.001)	(0.008)		(0.005)	(0.004)	(0.003)	
$MSCI-ZAR$	**-0.401**	**0.251**	**-1.401**	-58.439	**0.860**	**-0.859**	-0.001	0.269
	(0.001)	(0.001)	(0.006)		(0.005)	(0.004)	(0.003)	

Note: Standard errors in parentheses. Bold cells are statistically significant at 5% level. The notation here is as presented in Section 3 and Appendix A. LL is the log likelihood.

The observation that the dependency between the emerging countries financial markets and the US monetary policy decreasing in the aftermath of the global financial crisis, demands further explanations to fill that gap. After the global financial crisis, as the interest rates hit the zero lower bound in advanced economies, the interest rate differentials, although still high, might have lost its importance in that period. Another way to look at the decreasing dependency is that, the nature of the monetary policy in the US has shifted. Most of the advanced economies started to implement quantitative easing policies and as a result of this policy a tremendous amount of liquidity has spread across the globe. Developing economies have benefited a lot from this flow of funds as well that reversed the dependency peaked during the global financial crisis that caused a liquidity shortage around the 2008.

Changes in the nature of monetary policy implementation in the US propose different dependence structure for each emerging country we study, due to the fact that this change in monetary policy is not only limited to quantitative easing policies of the advanced countries. It may also reflect the outcomes of unconventional monetary policy implementation in emerging markets, especially in Turkey and Brazil. Some emerging markets re-organized their monetary policy with new tools for financial stability and new space for macroprudential policies. This may be another explanation for the disappearance of the dependence between the exchange rate and monetary policy in the US.

5 Concluding Remarks

Many emerging countries are affected from the tapering decision of Federal Reserve that started towards the end of 2012. The tapering resulted in substantial drops in stock market indices and large exchange rate depreciations through the expectations of decreasing capital inflows and carry-trade activity to emerging markets. The movements within the financial markets of the emerging countries responding to tapering suggest that in the era of financial globalization, emerging market financial markets are not insulated from the Federal Reserves policy stance.

In this article we try to see the evolution of the co-movement between the US monetary policy and the financial markets of certain emerging market countries that has been named as "Troubled" or "Fragile" at certain periods. There are studies in the literature that questions the effect of the US monetary policy on the financial markets of emerging economies and even the co-movement between US tapering decisions and emerging markets yet these studies are mostly concentrated after the subprime crisis era. It is true that the subprime crises caused a global spillover effect, yet emerging market countries were always affected from the interest rate differential of US through capital flows and carry-trade. In this respect, we conduct our analysis covering a period more than a decade to observe how the dependency of each vulnerable emerging market countries to the US monetary policy evolved over time.

Our results reveal the increasing dependency throughout the end of 1990s especially for the far-eastern countries, we can observe the Russian crisis at the beginning of 2000 and other local stressful periods of certain groups of emerging markets. Given the persistence parameter we get via time-varying copulas of Patton (2006), we can clearly observe the heterogeneity among different emerging market countries and differences between the exchange rate and stock markets. One surprising result is that many of the emerging market countries indeed is not that dependent to the US monetary policy and monetary policy uncertainty compared to pre-subprime crisis period. The factors accounting for the dependency and the persistence of dependency deserves further exploration yet we could definitely state that it is not all doom and gloom for the "Fragile" and "Troubled" group.

This research is valuable, because considerations of different levels of dependence of fragile and/or vulnerable countries to the US monetary policy will affect the diversification policies of the investors worldwide, which will eventually affect the risk premia in these fragile countries. In addition to that, if there is increasing dependency over time, systemic costs are too severe, and the global economy may require a coordinating agency to improve resource allocation. Such policy considerations are absent from previous empirical research on heavy tails in international markets and provide a further motivation for our paper. What is arguably more important from an economic point of view is that there are aggregate consequences for elevated asset dependence and uncertain asset dependence. Therefore, we present the dependence across emerging countries and over time.

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Appendices

A Copula Functions

Normal Copula: the normal copula can be defined as follows:

$$\mathcal{C}_N(u_1,u_2|\rho)=\int_{-\infty}^{\Phi^{-1}(u_1)}\int_{-\infty}^{\Phi^{-1}(u_2)}\frac{1}{2\pi\sqrt{(1-\rho^2}}\exp\left\{\frac{-(r^2-2\rho rs+s^2)}{2(1-\rho^2)}\right\}drds,\rho\in(-1,1)$$

where the dependence parameter ρ, is the linear correlation coefficient. Its dynamic equation may be written as:

$$\rho_t=\Lambda\left(\omega_N+\beta_N\rho_{t-1}+\alpha_N\cdot\frac{1}{10}\sum_{j=1}^{10}\Phi^{-1}(u_1,t-j)\cdot\Phi^{-1}(u_2,t-j)\right)$$

The Normal copula is symmetric and has no tail dependence, i.e. $\lambda_L=\lambda_U=0$. The Kendall's tau (τ) may be computed based on the correlation coefficient as $\tau=(2/\pi)\arcsin\rho$. $\Lambda(\cdot)$ is the logistic transformation to keep the parameters in their intervals.

Rotated-Gumbel Copula: or Survival Gumbel copula has the following form:

$$\mathcal{C}_{RG}(u_1,u_2|\theta)=u_1+u_2-1+\mathcal{C}_G(1-u_1,1-u_2|\theta),$$

where $\mathcal{C}_G$ corresponds to the Gumbel copula. The dependence parameter θ has a dynamic equation that can be written as:

$$\theta_t=\Lambda\left(\omega_{RG}+\beta_{RG}\theta_{t-1}+\alpha_{RG}\cdot\frac{1}{10}\sum_{j=1}^{10}|u_{1,t-j}-u_{2,t-j}|\right)$$

The Rotated-Gumbel copula has only lower tail dependence, given by $\lambda_L=2-2^{1/\theta}$, and the Kendall's τ may be computed as $\tau=1-\theta^{-1}$

Symmetrized Joe-Clayton Copula: this copula was defined by Patton (2006) and takes the form of :

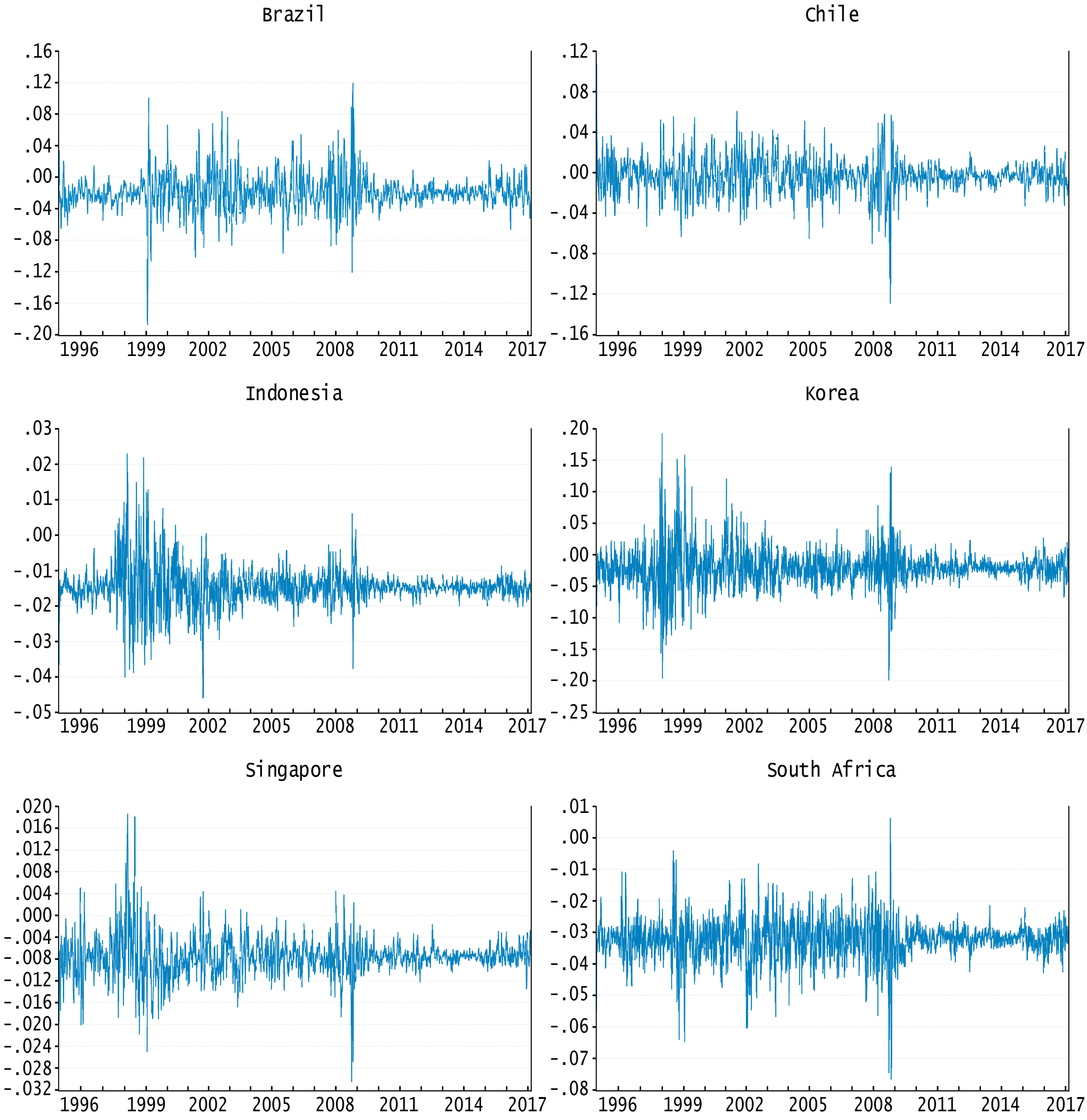
$$\mathcal{C}_{SJC}(u_1,u_2|\lambda_U,\lambda_L)=\frac{1}{2}\cdot(\mathcal{C}_{JC}(u_1,u_2|\lambda_U,\lambda_L)+\mathcal{C}_{JC}(1-u_1,1-u_2|\lambda_U,\lambda_L)+u_1+u_2-1)$$

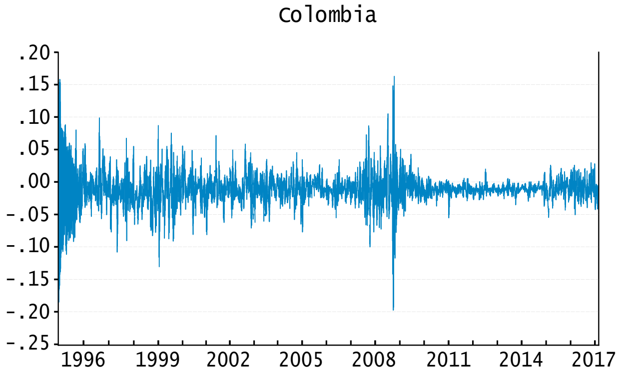
where $\mathcal{C}_{JC}$ is the Joe-Clayton copula, also called BB7 copula of Joe (1997), which can be illustrated as:

$$\mathcal{C}_{JC}(u_1,u_2|\lambda_U,\lambda_L)=1-\left(1-\left\{[1-(1-u_1)^\kappa]^{-\gamma}+[1-(1-u_2)^\kappa]^{-\gamma}-1\right\}^{-1/\gamma}\right)^{-1/\kappa}$$

with $\kappa=1/\log_2(2-\lambda_U)$, $\gamma=-1/\log_2(\lambda_L)$ and $\lambda_U,\lambda_L\in(0,1)$

B Dependence of Emerging Market XRs to FED-DFF




Colombia
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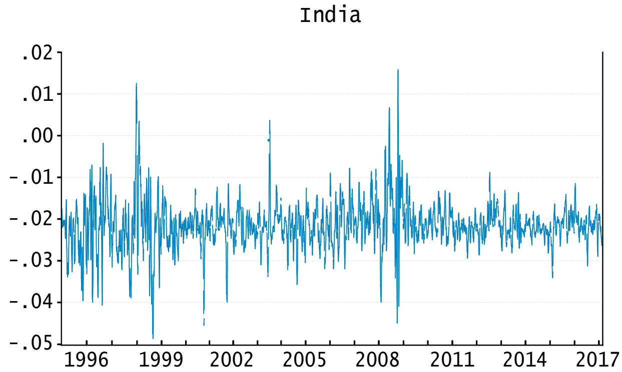
1996 1999 2002 2005 2008 2011 2014 2017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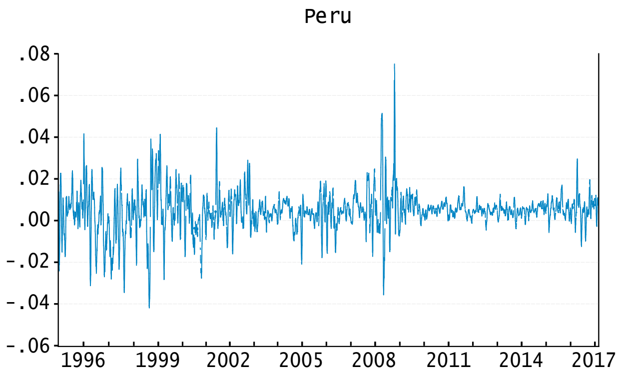
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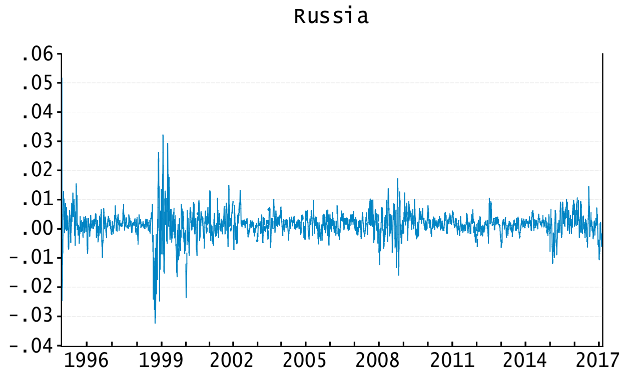
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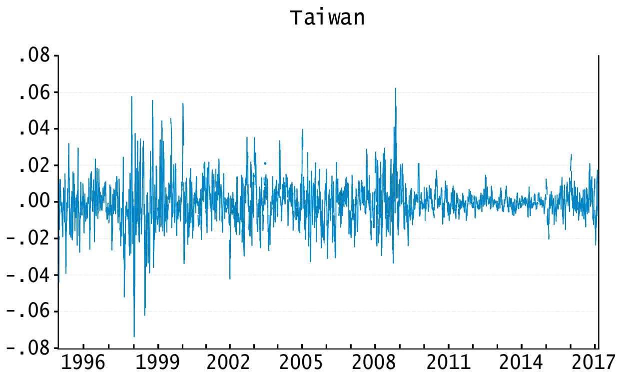
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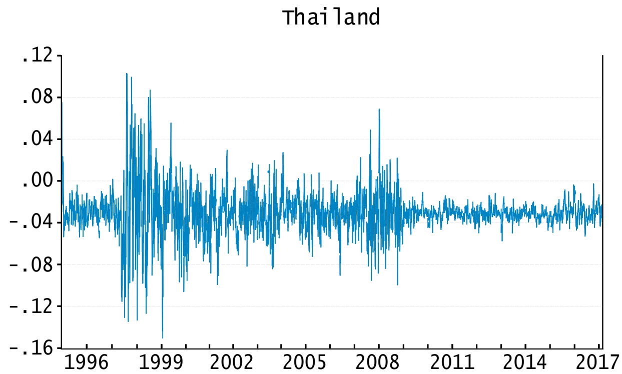
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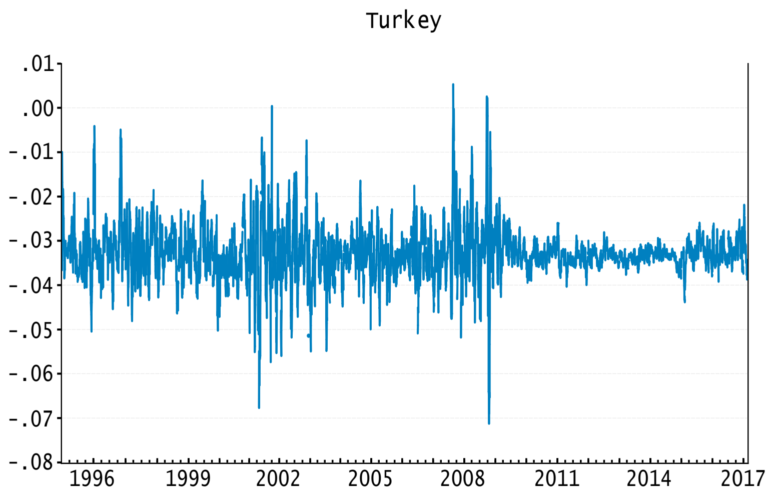
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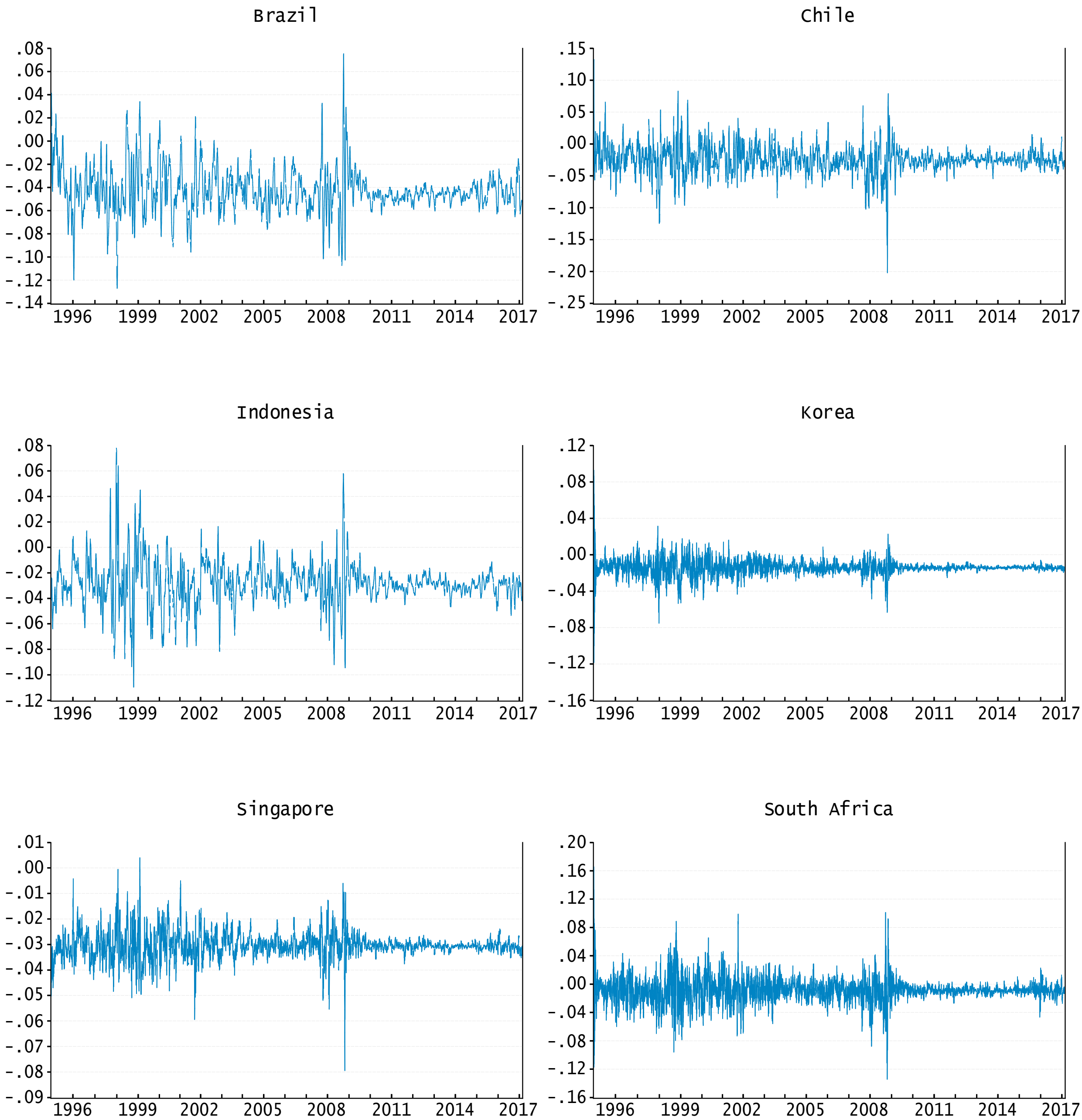
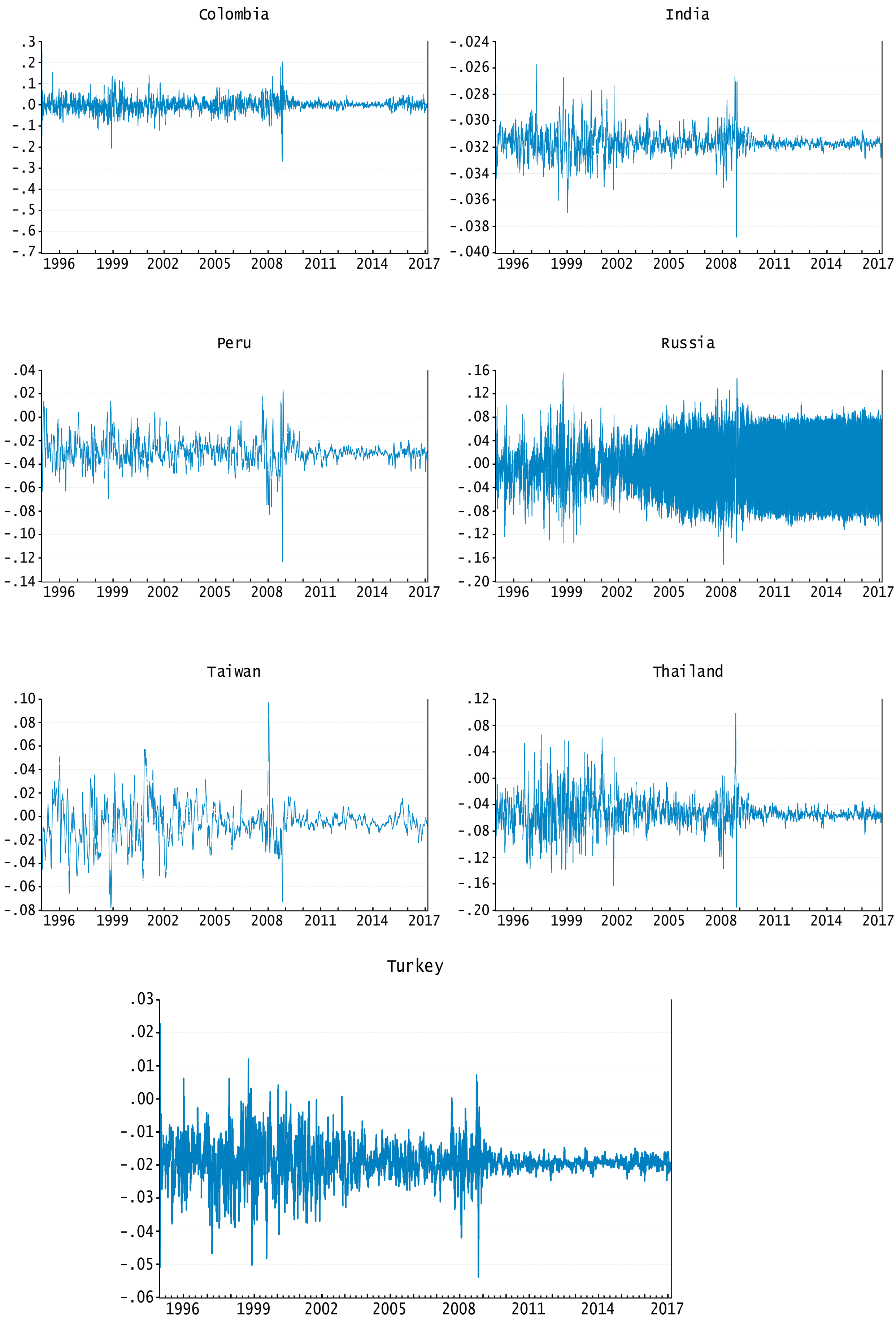
C Dependence of Emerging Market MSCIs to FED-DFF

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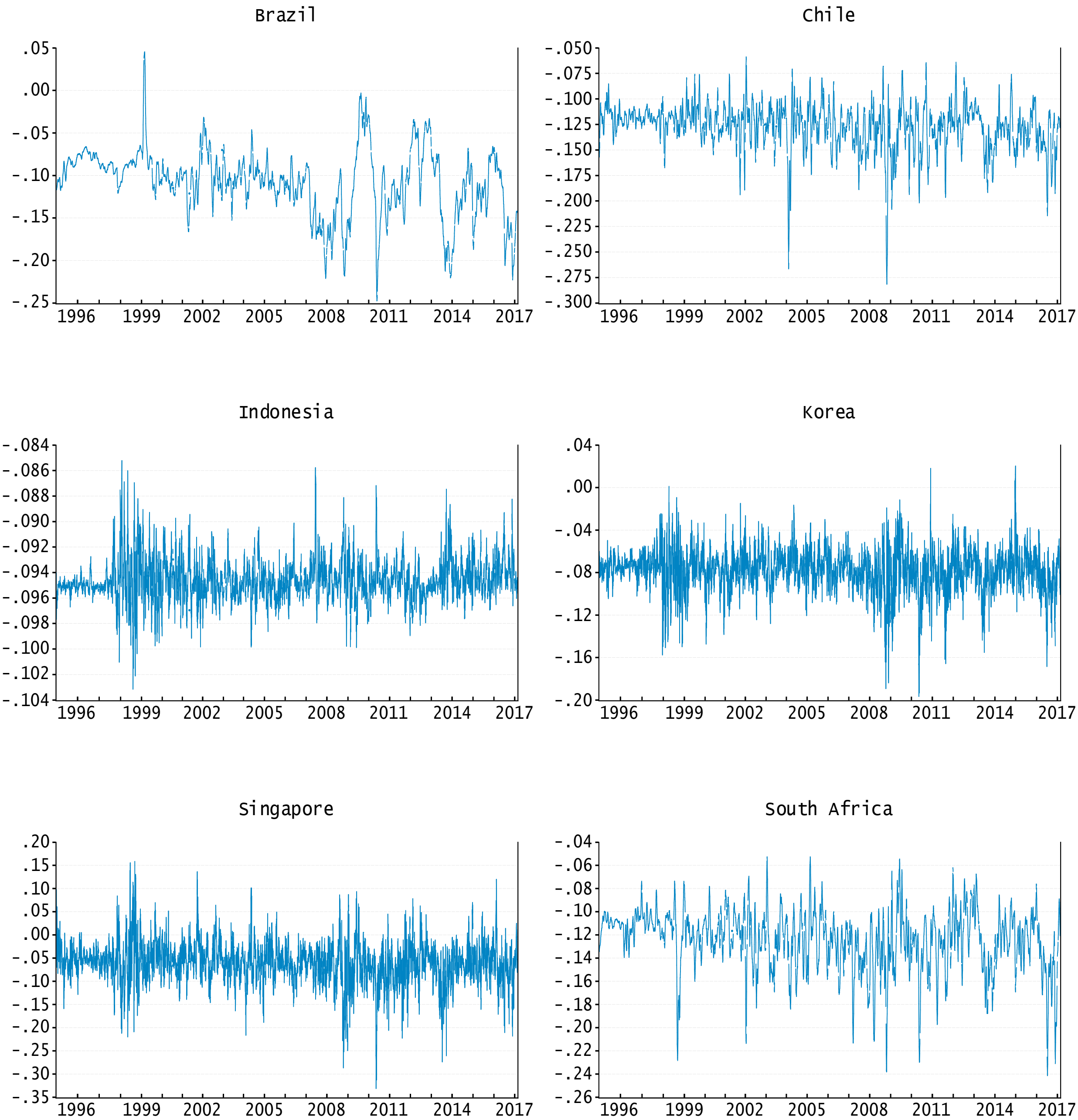
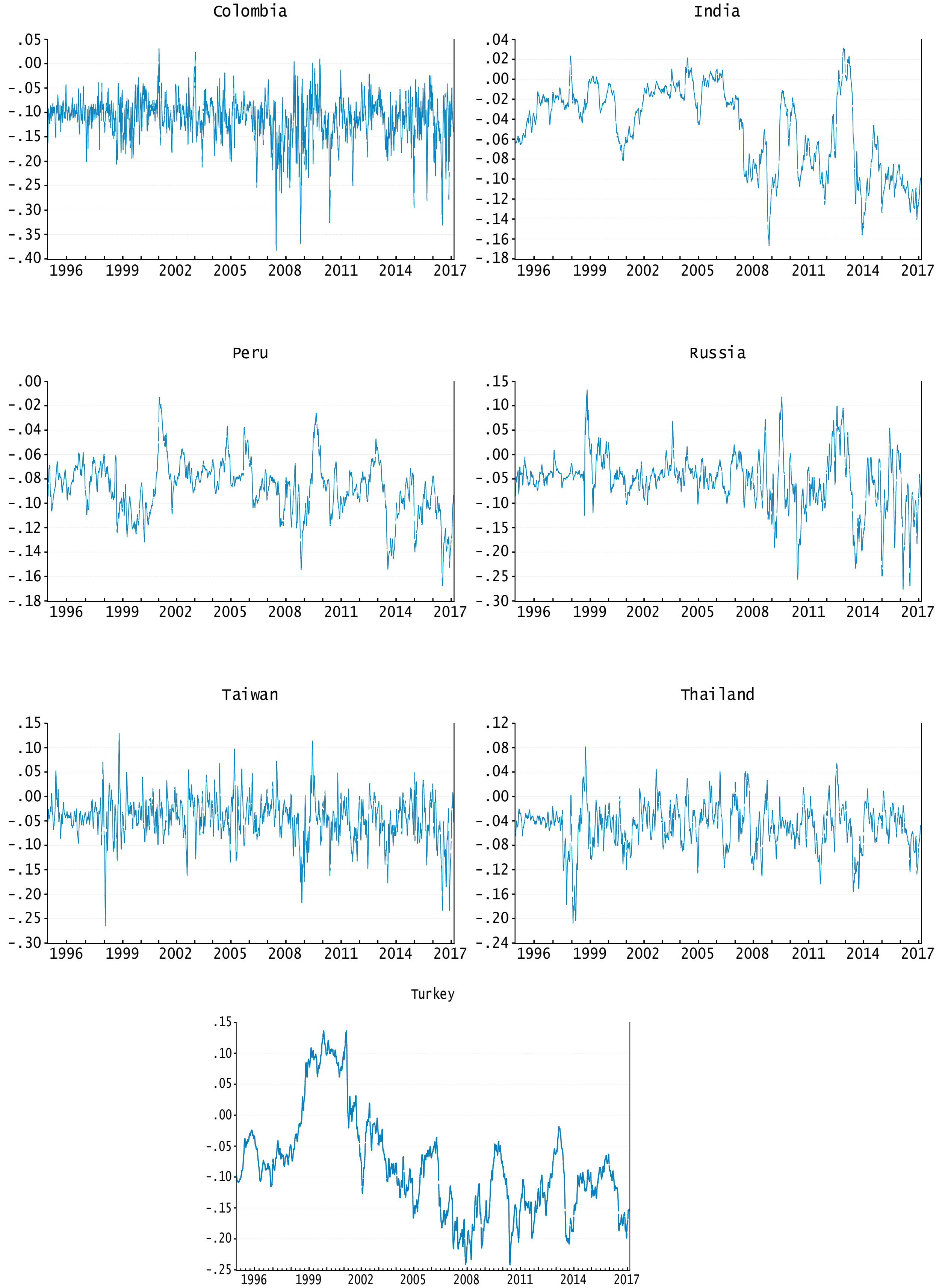
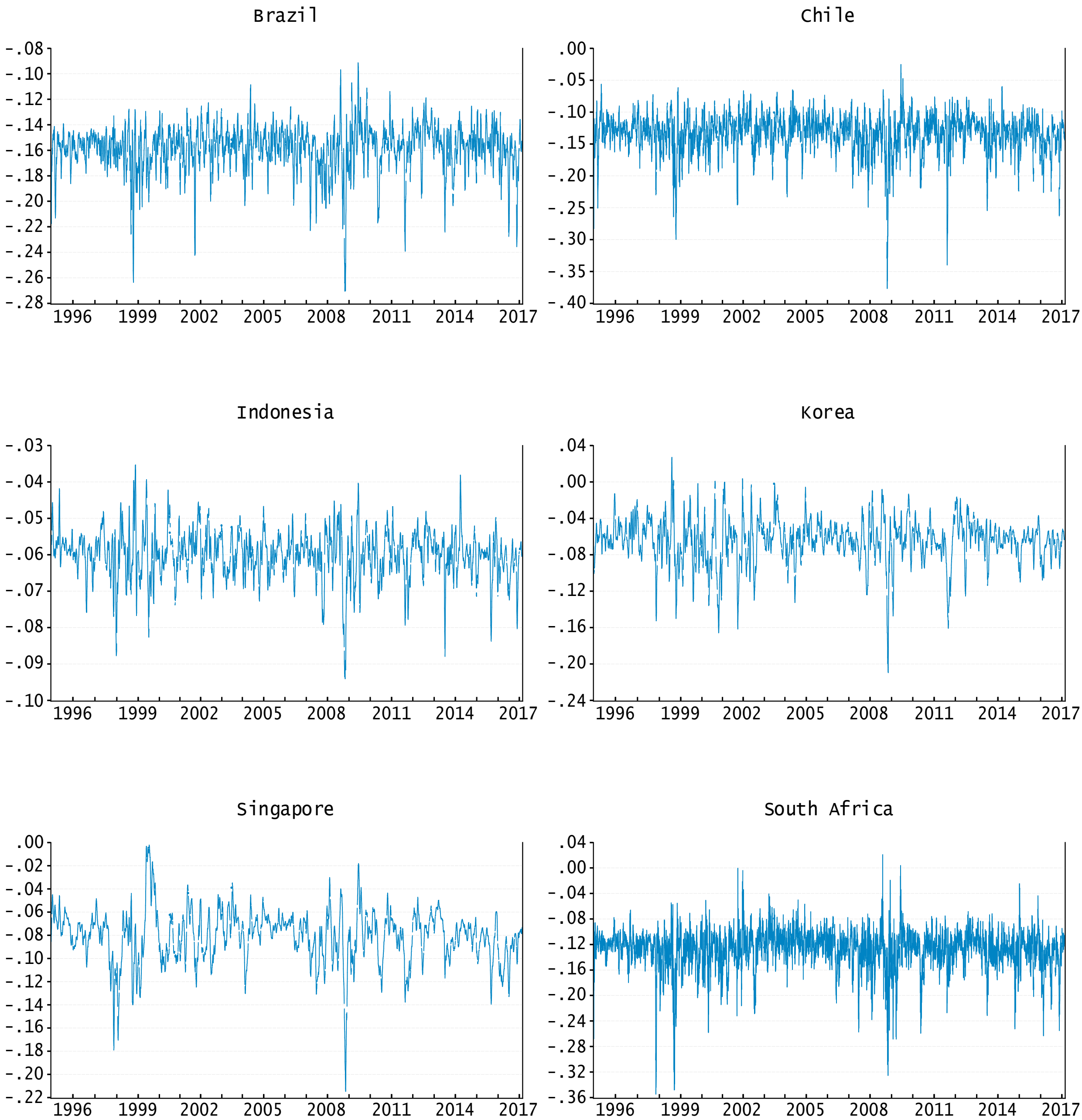
1996 1999 2002 2005 2008 2011 2014 2017

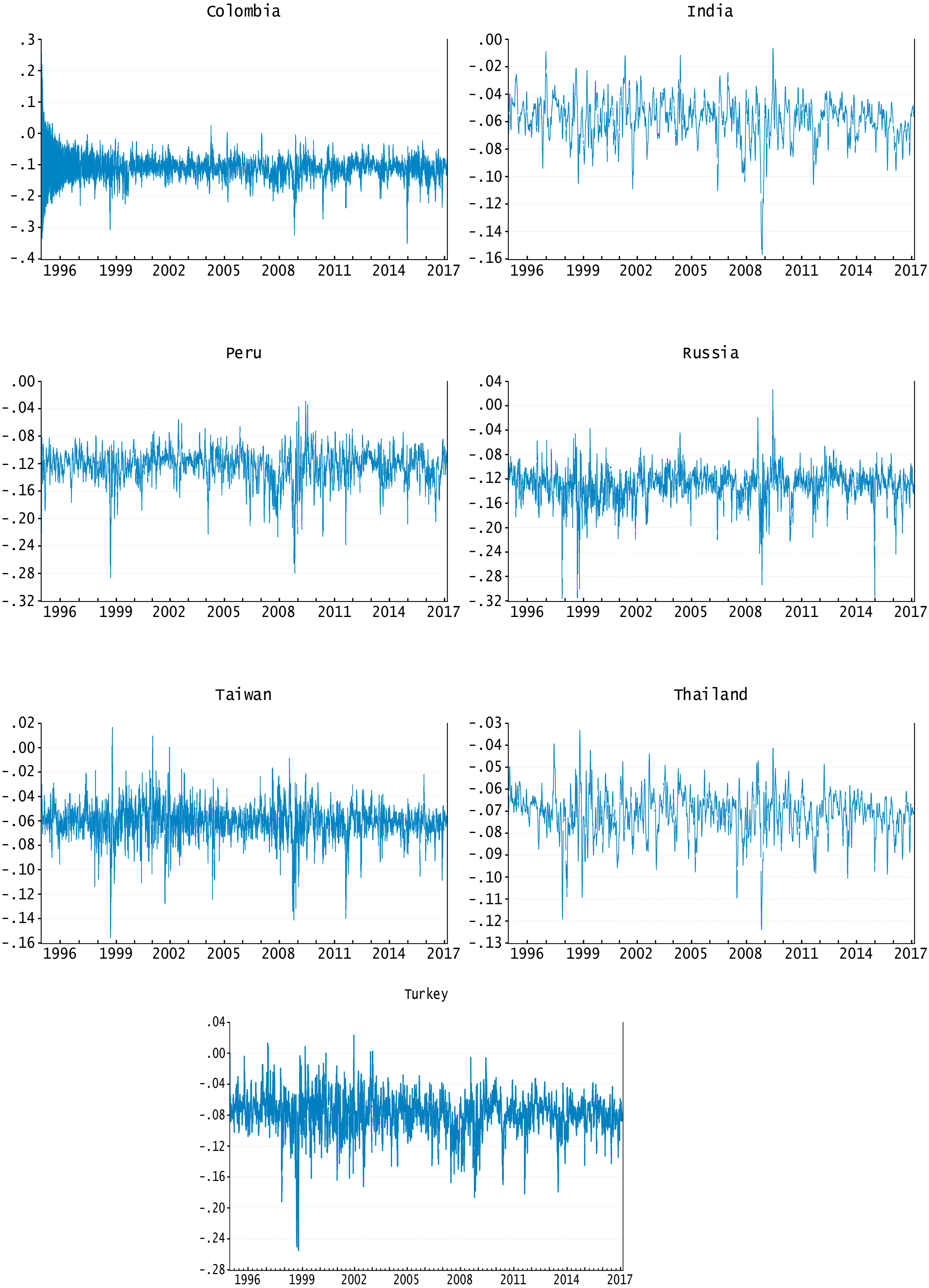
D Dependence of Emerging Market XRs to MOVE




Colombia
India
Peru
Russia
Taiwan
Thailand
Turkey

E Dependence of Emerging Market MSCIs to MOVE




Colombia
India
Peru
Russia
Taiwan
Thailand
Turkey
1996
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