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Economic engagement and within emerging markets integration

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ABSTRACT

We explore the co-movements between emerging markets by employing dynamic conditional correlation approach. We additionally explore the factors that might drive the conditional correlations between emerging markets. We show that trade with the high income countries is a more important driver of the co-movements between emerging markets relative to trade with other emerging markets either within or outside the geographic region of the given country. We further document that the overall health of an economy, investment and market depth explain the correlation between emerging markets. Evidence is also provided that although, the recent emerging markets and global financial crises raised the correlation between emerging markets, not all country pair correlations increased around the period of the crisis. The findings show that economic engagement as opposed to geographic proximity is more relevant in describing within emerging markets integration. The findings suggest that diversification gains could be achieved by strategically investing across some emerging markets even in crisis periods.

1. Introduction

We examine the relationship between cross-country economic activity and the integration among emerging markets. International financial market linkages have relevance for cross-market diversification benefits, macro-economic policies, the price discovery process and the vulnerability of global financial markets to crisis originating from other countries (see e.g. [Stulz, 1999](#); [Bekaert et al., 2002](#); [Büttner and Hayo, 2011](#)). [Bekaert et al. \(2002\)](#), [Lombardo and Pagano \(2002\)](#), and [De Jong and de Roon \(2005\)](#) for instance show that increased interdependence amongst financial markets facilitates cross-border investment, reduces capital cost and broadens the opportunities for investment. International capital flows minimise capital constraint problems thereby promoting more productive investments ([Acemoglu and Zilibotti, 1997](#)), additionally, capital flows allow international risk sharing which may facilitate risk taking and creative investment in the domestic economy ([Saint-Paul, 1992](#); [Obstfeld, 1994](#)). Financial integration permits a more efficient capital allocation across countries – this has a growth enhancing effect.

Financial market depth and liquidity, institutional quality and economic activity have consequences for financial markets integration (see e.g. [Campa and Fernandes, 2006](#); [Bekaert et al., 2011](#); [Boamah et al., 2017a,b](#)). [Deléchat et al. \(2010\)](#) argue that capital market development leads to increased capital inflows which may consequently lead to a surge in financial market integration. Emerging markets are uniquely characterised by smaller market depth, illiquidity, limited trade among themselves and weak institutional environment. [Hearn and Piesse \(2013\)](#); [Hearn \(2014\)](#) and [Boamah \(2015\)](#) for instance observe that emerging markets are largely illiquid. Similarly, the World Development Indicators (WDI, 2018) data show that emerging markets are more economically engaged with high income economies than with themselves. The evidence suggests that emerging markets may exhibit a high degree of integration with high income economies relative to themselves. It is arguable from the WDI's data that a significant chunk of the

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co-movements between emerging market returns could result from their respective co-movements with the developed market returns.

Current account balance may provide signals about the integration of financial markets. A country with limited capacity to convert domestic savings into domestic assets may attract less inflow of foreign capital; such a country may record surplus in its current account. Current account surplus may therefore be associated with lower levels of financial market integration. [Herrmann and Winkler \(2009\)](#) note that most emerging markets tend to have limited current account deficits relative to what is predicted by theories partly because of less developed and weak domestic financial markets. Less developed financial markets constrain the ability of emerging markets to attract foreign capital and to create domestic assets out of domestic savings. Such economies may record current account surplus or minimal current account deficits due to their inability to invest in a manner that is consistent with theoretical predictions. Thus, the current account openness signals financial market integration ([Bracker et al., 1999](#); [Chambet and Gibson, 2008](#); [Deléchat et al., 2010](#); [Shi et al., 2010](#)).

Whilst the integration of financial markets have been studied, very little is known about the integration among emerging stock markets (ESMs) and the drivers of within ESMs integration. For instance, [Guesmi and Nguyen \(2011\)](#) investigate the global integration of four emerging market regions, whereas, [Johnson and Soenen \(2003\)](#) analyse the co-movements between the stock markets in the Americas and the US market. Also, [Boamah \(2017\)](#) explores the integration of ESMs with the world market after accounting for within emerging market integration. However, none of these studies have exhaustively examined integration amongst ESMs and the forces behind such integration process.

This study builds on prior emerging market studies and explores within ESMs integration. We examine the degree of country-pair integration amongst the markets in our sample. Also, the integration between each country and the broad emerging markets are examined. The approach enables us to explore not only the integration between individual markets and the emerging markets index such as in [Guesmi and Nguyen \(2011\)](#) and [Boamah \(2017\)](#), but most importantly, to find out the relevant countries that drive the emerging market integration of the individual countries. This is important in determining the markets that will yield the highest diversification benefits when combined into ESMs focussed portfolios. In addition, the study investigates the relationship between market integration and economic engagement and the current account balance of ESMs. The paper explores the relevance of both emerging markets trade amongst themselves and with the developed world on the within ESMs integration. Such decomposition is important from policy perspective, in that it will enable policy makers to better understand the potential impact of overseas crisis on their domestic financial markets.

Understanding the degree and drivers of ESMs integration amongst them is important to both investors and policy makers. It will provide global investors insights into the nature of the likely risks and benefits from global diversification. From policy standpoint, understanding the drivers of financial integration will provide useful insights on the transmission of crisis, potential capital outflows during crisis and the appropriate policy response to financial globalization. An important question that follows is do fundamentals drive the integration of emerging markets? The paper explores these issues and provides some insights. Insights into the integration of financial markets are relevant to investors, portfolio managers, and financial market regulators given that expected returns and variances are needed when constructing risk-return portfolios.

The paper provides evidence of time-varying conditional correlation among emerging markets. Evidence is provided that bilateral trade with the high income countries describes the time-variations in emerging market correlations more than trade with emerging markets either within or outside the geographic region of the home country. The study shows further that current account balance, market size, and liquidity are important predictors of within ESMs integration. Evidence is also provided that the emerging markets respond to shocks from both developed and emerging markets; however, the country pair correlations between some ESMs were largely low even around crisis periods.

The remainder of the paper is as follows. Section 2 presents the related literature, whilst, Section 3 presents the methodology of the study. Section 4 presents the data with Section 5 presenting the empirical results. The conclusion is presented in Sections 6.

2. Related literature

[Li et al. \(2004\)](#), [Lim and Hooy \(2010\)](#), and [Bae et al. \(2012\)](#) argue that increased financial market integration improves information transmission across markets. Similarly, [Hou and Moskowitz \(2005\)](#) provide evidence that equity price delay has positive relationship with financial market segmentation. That is segmentation delays the diffusion of global information to emerging markets and hence the price discovery process. As argued by [Boehmer and Wu \(2012\)](#) efficient financial markets impact on the productivity and growth of nations. Integration therefore has global welfare enhancing effects ([Errunza and Losq, 1989](#); [Basak, 1996](#)), although, it makes markets more vulnerable to global financial crisis. In a recent study, [Aristeidis and Elias \(2018\)](#) examine the response of global financial markets to the 2016 Brexit referendum. They observe evidence of limited market contagion and rising market volatility around the referendum period. They show higher financial market volatility in the pre and post-referendum periods relative to the period after the United Kingdom government triggered article 50 to exit the European Union. The evidence corroborates the findings of prior studies on the impact of market linkages on cross-border crisis transmission.

In a related study, [Boamah et al. \(2017a,b\)](#) argue that it is important for countries to facilitate the global integration of their financial markets so as to reap the full benefits of integrated markets, whilst, implementing financial stability measures aimed at minimising the effects of global crisis on their national markets. Similarly, [Carriero et al. \(2007\)](#) observe that rising financial market integration should reduce the cost of capital, increase the investment opportunity set for all investors, and bring about welfare gains arising from higher savings and growth emanating from international risk sharing.

[Freimann \(1998\)](#) and [Cavaglia et al. \(2000\)](#) suggest that increased economic integration minimises cross-border diversification benefits. Studies such as [Schwert \(1990\)](#), [Roll \(1992\)](#), [Canova and De Nicolo \(1995\)](#), [Griffin and Karolyi \(1998\)](#), [Phylaktis and](#)

Ravazzolo (2002) and Bai and Green (2010) provide evidence of long run positive linkages between economic integration and stock prices. The evidence shows that barriers aimed at insulating domestic markets from global influences may be ineffective due to economic engagement amongst countries. Corroborating, Boamah et al. (2017a,b) show that the real sector was the major conduit through which the 2008 global financial crisis (GFC) impacted on the African financial markets (AFMs), although, prior to the crisis these markets were least integrated with the global financial system.

Studies such as Bracker et al. (1999), Friedman and Shachmurove (1997) and Guesmi and Nguyen (2011) show that countries in proximate geographic region exhibit high level of market integration. Guesmi and Nguyen argue that the integration of emerging market regions could be explained by the regional level of trade openness. Boamah et al. (2017a,b) however, show that the emerging African markets, although, are located in the same geographic area, tend to be less integrated amongst themselves relative to their levels of global integration. They argue that trade linkages is a significant driver of the integration of the African markets.

3. Methodology

3.1. Estimating dynamic correlations

We adopt Equation (1) to estimate a univariate GARCH(1,1) model for each of the ESMs. We adopt Eq. (1a) to remove possible autocorrelation in the return indices. Eq. (1b) a GARCH(1,1) framework is employed as the variance equation. The Equation infers that the conditional variance (M_t) is driven by the mean volatility level (ω), lagged conditional variance (M_{t-1}), and the previous period shocks (v_{t-1}). The volatility persistence of a shock is estimated as ($\eta + \varpi$).

$$R_t^i = b_i^0 + b_i^1 R_{t-1}^i + v_t^i, v \sim n. d. (0, M_t) \tag{1a}$$

$$M_t^i = \omega_i + \eta_i (v^i)^2_{t-1} + \varpi_i M_{t-1}^i \tag{1b}$$

$\omega = \text{meanvolatilitylevel}$; $\eta = \text{ARCHcoefficient}$; $\varpi = \text{GARCHcoefficients}$;

$M^i = \text{conditionalvariance}$; $v^i = \text{conditionalmeanorrandomerrorterm}$;

The dynamic conditional correlations (DCC) model proposed by Engle (2002) is used to estimate the conditional correlations (μ_t) between any pair of countries. We specify the conditional variance matrix (μ_t) as in Eq. (2a) and the functional form of R_t as in Eq. (2b).

$$\mu_t = D_t R_t D_t \tag{2a}$$

$$R_t = (Q_t^*)^{-1} Q_t (Q_t^*)^{-1} \tag{2b}$$

$$Q_t = (1 - a - b)Q + a\varepsilon_{t-1}\varepsilon'_{t-1} + bQ_{t-1} \tag{2c}$$

$\mu_t = \text{conditional variance matrix}$;

$D_t = a k \times k \text{ diagonal matrix of time - varying standard deviations. } D_t = \sqrt{M_t^i}$.

$R_t = \text{symmetric matrix of time - varying correlation coefficients, it consists of the correlation coefficients between any pair of countries.}$

$Q_t^* = \text{is a diagonal matrix consisting of the square root of the diagonal elements of } Q_t$. a and b are scalars.

The standardized residuals is formulated as $\varepsilon_t = \frac{v_t}{D_t}$ whereas the unconditional covariance of the standardized residuals is estimated as $Q = E[\varepsilon_t \varepsilon_t']$.

3.2. Estimating emerging markets correlation and its drivers

The emerging market conditional correlation of country i ($EMCorr$) at time t is estimated as the average of country i 's conditional correlations with each of the other markets (j), excluding its conditional correlation with itself. That is, the emerging market correlation is estimated as:

$$EMCorr_{i,t} = \frac{\sum_{j=1}^{N-1} P_{j,t}}{N - 1} \tag{3}$$

The approach enables us to estimate a measure of emerging market integration of country i that reflects its dynamic response to each of the other sampled markets (j). This provides a useful measure for the purpose of exploring the economic and market based drivers of the conditional correlations amongst the emerging markets in our sample.

Additionally, we examine the relevance of market and economic factors in driving the co-movement among emerging markets via Eq. (4). We examine the influence of economic factors such as exports, imports, and current account position on the degree of correlation within emerging markets. Prior studies such as Griffin and Karolyi (1998), Bracker et al. (1999), Campa and Fernandes

(2006), Bai and Green (2010), Bekaert et al. (2011) and Boamah et al. (2017a,b) show the relevance of economic engagement to financial market integration. We however, adopt three different measures of trade – trade with countries within the geographic region of country i , trade with emerging markets, and trade with high income countries. We employ exports and imports as our trade proxy.

$$EMCorr_{i,t} = \alpha_0 + \beta^1 CACC_{i,t} + \beta^2 FDI_{i,t} + \beta^3 VTRAD_{i,t} + \beta^4 MCAP_{i,t} + \beta^{5,m} \sum_{m=1}^3 IMP_{m,i,t} + \beta^{6,m} \sum_{m=1}^3 EXP_{m,i,t} + \varepsilon_t \quad (4)$$

$EMCorr$ = Emerging market correlations, β = coefficients, a = intercept ,

EXP = log of exports to GDP, IMP = log of imports to GDP,

$MCAP$ = log of total market capitalization to GDP, FDI = FDI net inflow to GDP,

$CACC$ = log of current account, $VTRAD$ = log of value of shares traded to GDP,

m = within region of i , outside region of i , and high income country.

Given the extent of economic and political cooperation among some geographically close emerging markets, we expect regional level trade to influence regional level financial market integration. Similarly, if emerging markets trade less with each other, but individually show a high degree of economic engagement with the high income countries, then it is possible for their respective economic activities with the high income countries to indirectly drive emerging market integration. Thus the focus on the import and export measures adopted by this study will yield a useful insight on trade and within emerging market integration linkages.

The study also explores the linkages between market size and liquidity on the within emerging markets degree of integration. Earlier studies such as Carrieri et al. (2007); Bekaert et al. (2011); Alagidede (2010); Carrieri et al. (2004); Hearn (2014) and Boamah et al. (2017a,b) show the relevance of market factors to cross-border investment flows and financial market integration.

4. Data and data source

The market data across 20 emerging markets were sourced from DataStream. The data covers the period March 1997 to January 2015. We use the total return index as a proxy for the market indexes of the sampled markets. Excess returns denominated in US dollars are employed in the study. The study adopts the US one month Treasury bill rate as the risk free rate. The monthly returns help in controlling for the potential impact of thin trading on the results of the study. The macroeconomic data such as current account, domestic debt to GDP, imports and exports are obtained from the World Development Indicators (WDI).

5. Empirical results

5.1. Descriptive statistics of the returns

Table 1 presents the descriptive statistics of the returns to the market indices of the sampled markets.

The Table shows that the lowest and highest mean annualized returns of the sampled ESMs are respectively -1.05% (Ghana) and 4.88% (Botswana). Positive annualised returns are observed for all the markets in our sample excluding Ghana and Thailand. The annualised standard deviations range from 17.88% (Tunisia) to 45.56% (Indonesia). Corroborating the evidence by Bekaert and Harvey (1997), Barry et al. (2002), and Boamah (2015) the results indicate that the ESMs are largely volatile. The returns exhibit excess kurtosis for all the markets; positive skewness for 7 markets; and non-normality of the returns for all the markets.

5.2. Emerging markets conditional correlations

Table 2 presents the results of estimating Eqs. (1a) and (1b). Panel A of the Table indicates largely significant coefficients of the mean equation excluding the constants. Panel B (Table 2), shows significant mean volatility level (ω) and ARCH (η) coefficient for all of the markets. The GARCH (ϖ) coefficients are significant statistically for all the markets, except Botswana and Morocco. The evidence ($\eta + \varpi$) is indicative of high volatility persistence on the sampled markets aside Botswana, Egypt, Ivory Coast and Ghana. Similarly, ω infers volatility clustering on the ESMs – previous period volatility impact on current volatility. The half-life of the volatility persistence is lowest for Botswana (1.31 months) and highest for Singapore (89.30 months). On average, the volatility persistence on the emerging markets has a half-life of 12.43 months.

The average country pair conditional correlations are presented in Table 3. The Table shows that the highest country pair correlations are 0.62–0.68 (Argentina and Mexico; Argentina and Brazil; Indonesia and Singapore; Singapore and Brazil; Singapore and Thailand; Singapore and Malaysia; South Africa and Mexico; South Africa and Brazil) and 0.75 (Mexico and Brazil), whereas, Jamaica, Ghana, Kenya, and Morocco generally exhibit low correlations with all of the emerging markets. The findings are consistent with prior studies such as Li et al. (2003), Pukthuanthong and Roll (2009) and Kodongo and Ojah (2011).

The evidence indicates that the relatively large emerging markets generally, exhibit higher levels of correlations with each other relative to their correlations with the smaller markets or the correlations between the smaller markets. This is consistent with the evidence by Boamah et al. (2017a,b) that market size impacts on market integration. The findings show that the emerging markets are least correlated amongst themselves; low correlations are indicative of potentially high across emerging markets diversification benefits.

Table 1
Descriptive statistic of excess returns.

Countries	Mean	Standard deviation	Kurtosis	Skewness	Jarque-Bera
World	0.92	16.34	1.97	-0.91	37.57***
Botswana	4.88	20.57	6.19	0.82	109.72***
Ivory Coast	4.62	24.07	2.01	0.05	8.50***
Egypt	3.34	33.84	1.58	0.01	17.32***
Ghana	-1.05	21.85	1.98	0.31	12.28***
Kenya	3.39	26.62	3.37	-0.60	13.46***
Mauritius	2.44	21.83	7.04	-0.98	172.30***
Morocco	0.82	20.25	1.44	0.274	22.00*
Nigeria	3.26	30.30	6.20	-0.51	96.40***
South Africa	1.83	28.92	2.89	-1.02	35.50***
Tunisia	0.28	17.88	2.63	-0.32	4.62***
Zambia	3.15	31.83	1.80	0.30	14.51***
Argentina	0.22	41.02	3.03	-0.78	21.03***
Brazil	3.06	39.32	2.61	-0.99	34.69***
Indonesia	1.44	46.56	0.88	-0.33	13.67***
Mexico	3.31	28.73	2.77	-0.63	81.75***
Singapore	0.72	27.63	4.59	-1.33	17.12***
Jamaica	2.40	27.90	2.58	-0.68	68.47***
Malaysia	0.43	30.11	4.46	1.21	37.56***
Thailand	-0.23	41.41	5.03	-0.27	17.49***
India	1.91	31.19	2.14	-0.57	42.29***

The sample covers the period March 1997 to January 2015. All the returns are expressed in US dollars and in monthly frequency. Mean and standard deviations are annualised by multiplying them by $\sqrt{12}$ and expressed in percentages. *** Significant at the 1% level. * Significant at the 10% level.

Table 2
Estimation of the mean and variance equations.

Country	Panel A: Mean Equation		Panel B: Variance equation				
	b^0	b^1	ω	η	ϖ	$\eta + \varpi$	HL
Argentina	0.0001	0.1197*	0.0031***	0.1502***	0.6310***	0.7812	3.81
Brazil	0.0078	0.0355	0.0014***	0.2525***	0.6609***	0.9134	8.65
Botswana	0.0108	0.2333***	0.0029***	0.1067***	0.0006	0.1073	1.31
Egypt	0.0076	0.2420***	0.0032***	0.0491***	0.5922***	0.6412	2.56
Ghana	-0.0020	0.4929***	0.0014***	0.2647***	0.2667***	0.5315	2.10
Kenya	0.0083	0.2025***	0.0008***	0.1493***	0.7156***	0.8649	5.77
Mauritius	0.0056	0.2176***	0.0004***	0.3200***	0.5989***	0.9188	9.19
Singapore	0.0017	0.0969*	0.0002***	0.1910***	0.8011***	0.9922	89.30
Tunisia	0.0008	0.1460***	0.0006***	0.0888***	0.7025***	0.7913	3.96
Morocco	-0.0057	-0.0860	0.0025***	0.6998***	0.0160	0.7158	3.07
Ivory Coast	0.0130	0.0285	0.0023***	0.3132***	0.2288***	0.5420	2.13
Nigeria	0.0081	0.1518**	0.0022***	0.4778***	0.2619***	0.7397	3.30
Indonesia	0.0032	0.2120**	0.0013***	0.2780***	0.6718***	0.9498	14.45
Malaysia	0.0007	0.2478***	0.0002***	0.2176***	0.7640***	0.9816	38.23
Mexico	0.0092	-0.0155	0.0006***	0.1855***	0.7479***	0.9334	11.06
South Africa	0.0047	0.0338	0.0016***	0.2098***	0.5619***	0.7717	3.67
Zambia	0.0078	0.0877**	0.0006***	0.2464***	0.7123***	0.9587	17.44
Jamaica	0.0059	0.1582*	0.0018***	0.3605***	0.4060***	0.7665	3.61
Thailand	-0.0011	0.0114	0.0007***	0.1555***	0.8022***	0.9577	17.04
India	0.0055	0.0851	0.0007***	0.0723***	0.8321***	0.9045	7.90

The table presents the results of estimating the mean equation of the GARCH(1,1) model.

$$R_t^i = b_i^0 + b_i^1 R_{t-1}^i + v_t^i, v_t^i \sim n. d. (0, M_t)$$

$$(a) M_t^i = \omega_i + \eta_i (v_t^i)^2 + \varpi_i M_{t-1}^i$$

$$(b)$$

***, ** and * are respectively 1%, 5% and 10% significance levels. HL is the half life of the volatility persistence $(\eta + \varpi)$. $HL = \frac{\log\left(\frac{\eta + \varpi}{2}\right)}{\log(\eta + \varpi)}$.

We explore the time-variations in emerging market correlations using Fig. 1. The Figure plots the graph of the emerging markets conditional correlations for each country estimated from Eq. (3). The Figure shows increased emerging market correlations for all of the countries around September 2008 which appears to coincide with the 2008 global financial crisis. Similar spikes are observed around 1998 for all the emerging markets, although, the jumps appear relatively high for Thailand, Malaysia, Brazil, Indonesia, Morocco, Tunisia, Singapore and Mexico. The spikes in correlations around the late 1990s appear to be capturing the 1998 East Asian

Table 3
Conditional correlations.

	AG	BR	BW	EG	GH	KN	MU	SI	TN	MO	IC	NG	IN	MA	ME	SA	ZM	JM	TH	
Brazil (BR)	0.63																			
Botswana (BW)	0.16	0.23																		
Egypt (EG)	0.31	0.39	0.06																	
Ghana (GH)	-0.06	-0.10	0.06	0.03																
Kenya (KN)	0.24	0.22	0.00	0.20	0.17															
Mauritius (MU)	0.25	0.29	0.17	0.27	0.06	0.29														
Singapore (SI)	0.51	0.62	0.26	0.36	0.02	0.23	0.30													
Tunisia (TU)	0.08	0.05	0.19	0.12	0.02	0.09	0.17	0.12												
Morocco (MO)	0.15	0.10	0.13	0.12	0.10	-0.09	0.18	0.12	0.30											
Ivory Coast (IC)	0.26	0.20	0.10	0.20	0.11	0.20	0.26	0.22	0.28	0.27										
Nigeria (NG)	0.13	0.27	0.16	0.22	-0.01	0.17	0.30	0.21	0.08	0.14	0.19									
Indonesia (IN)	0.36	0.47	0.14	0.38	0.08	0.28	0.28	0.63	0.21	0.08	0.24	0.17								
Malaysia (MA)	0.36	0.46	0.13	0.29	0.05	0.16	0.22	0.65	0.15	0.08	0.13	0.24	0.58							
Mexico (ME)	0.63	0.75	0.34	0.36	0.01	0.26	0.23	0.68	0.03	0.06	0.17	0.25	0.50	0.46						
South Africa (SA)	0.48	0.68	0.40	0.42	0.09	0.22	0.27	0.62	0.19	0.16	0.24	0.24	0.49	0.44	0.66					
Zambia (ZM)	0.31	0.27	0.16	0.01	-0.02	0.13	0.24	0.15	0.14	0.13	0.15	0.13	0.15	0.08	0.26	0.17				
Jamaica (JM)	0.07	0.07	0.02	0.08	0.17	0.09	0.09	0.11	-0.10	-0.04	0.05	0.10	0.07	0.11	0.13	0.08	0.04			
Thailand (TH)	0.44	0.52	0.22	0.35	0.15	0.21	0.29	0.63	0.19	0.17	0.26	0.23	0.58	0.51	0.53	0.60	0.16	0.01		
India (ID)	0.36	0.55	0.22	0.44	0.07	0.25	0.30	0.56	0.16	0.13	0.30	0.18	0.48	0.44	0.48	0.54	0.09	0.05	0.45	

Country pair dynamic conditional correlations between emerging markets return.

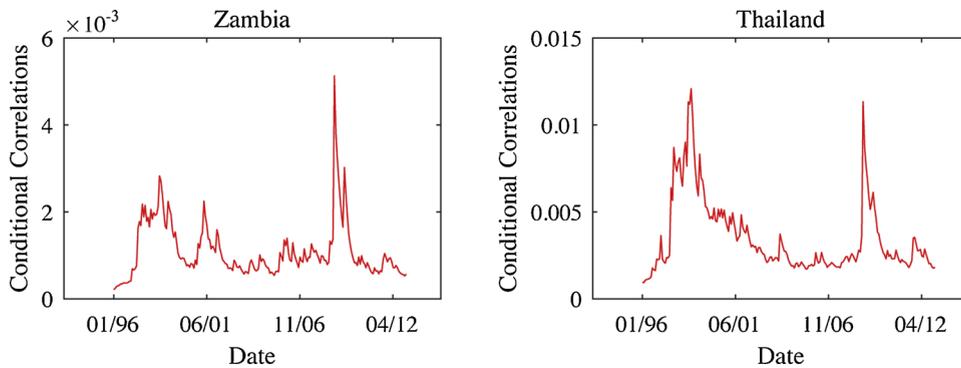


Fig. 1. Conditional correlations.
This figure presents the average of the conditional correlations for a given country and all of the other countries.

financial crisis. Fig. 1 shows further that aside the crisis periods, the dynamic correlations between the emerging markets were generally low. The findings suggest contagion across the emerging markets around periods of financial market turmoil. This corroborates the finding of contagion observed by studies such as Corsetti et al. (2005), Luchtenberg and Viet Vub (2015), Alexakis et al. (2016), Boamah (2017) and Aristeidis and Elias (2018). Fig. 1 indicates time-varying conditional correlations between the emerging markets in our sample.

The evidence in Fig. 1 may obscure the interdependence between the individual markets and hence the true diversification potential of across emerging markets portfolio. A country may exhibit a high correlation with the emerging market factor, although, that may be influenced by its interdependence with some few emerging markets.

This provides opportunities for investors to achieve higher diversification by identifying and holding a portfolio of less integrated emerging markets instead of holding a broad emerging market index. An important question is which country or countries (j) may drive the emerging market integration of country i? An answer to this question is very important since a low level of correlation between countries may signify diversification benefits. Identifying the countries that are least correlated will provide signals about the countries with diversification opportunities and the potential transmission of crisis across emerging markets.

We explore these issues in Fig. 2. The figure plots the country pair dynamic conditional correlations. The Figure shows that the response of the respective emerging markets to the emerging market factor are driven by their country pair correlations with few of the markets in our sample. For instance, the emerging markets correlation of Brazil is mainly the outcome of its correlation with Argentina, Singapore, Indonesia, Malaysia, Mexico, South Africa, Thailand and Indonesia. Similarly, Argentina’s conditional correlation with the emerging market factor depends largely on its conditional correlation with markets such as Brazil, Mexico, Indonesia, Thailand and Mauritius. South Africa exhibits a high level of correlation with the emerging market factor but that is largely the outcome of its correlation with Brazilian, Botswana, Mauritian, Mexican, Thai and Indian markets.

The low country pair correlations between some of the country pairs persist even around the crisis periods. For instance, Mexico

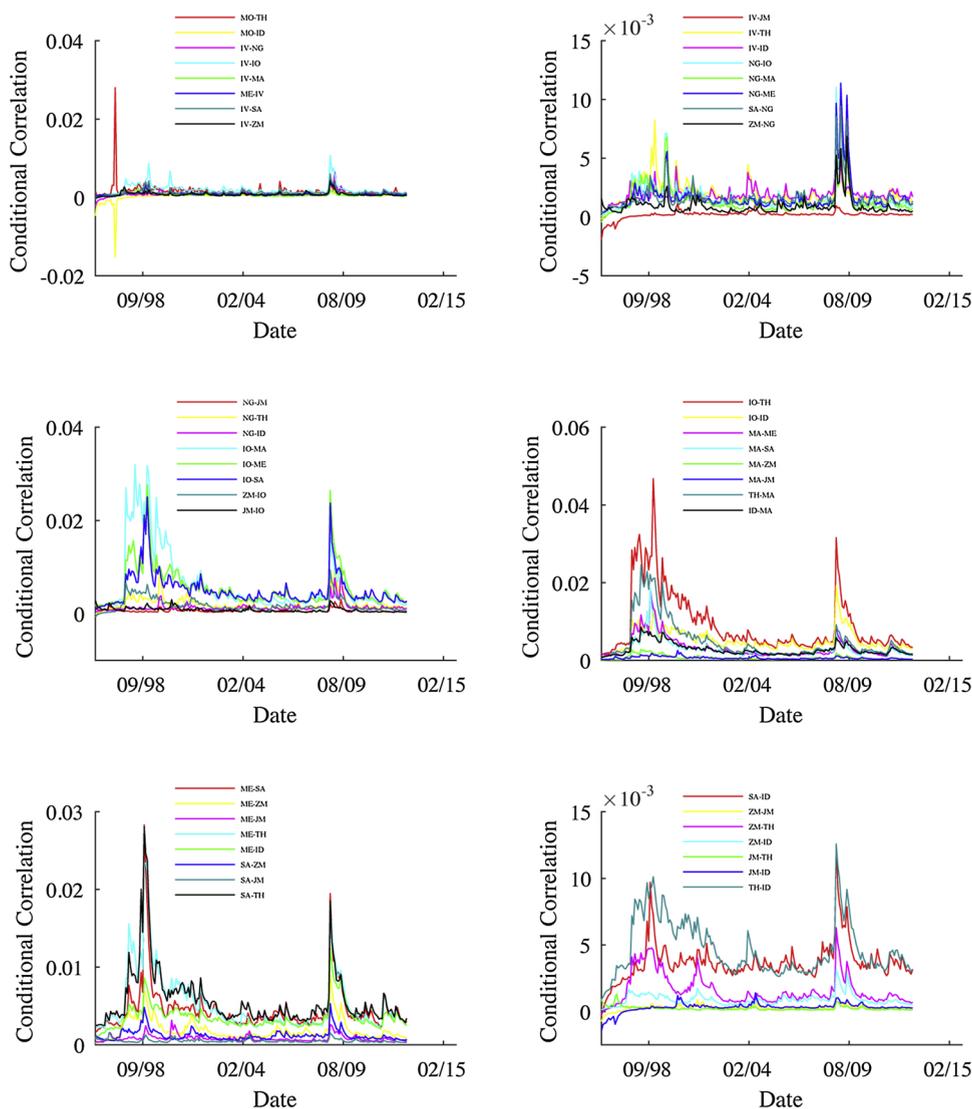


Fig. 2. Country pair conditional correlations. The Figure presents the country pair conditional correlations amongst the emerging markets studied. The correlations between each country and the remainder of the countries are presented.

and Jamaica, Ghana and Kenya, Egypt and Jamaica, Kenya and Tunisia, Kenya and Jamaica, Mauritius and Jamaica, Singapore and Zambia, Mauritius and Nigeria, Mexico and Morocco, Malaysia and Morocco, Mexico and Tunisia, and South Africa and Jamaica show largely low levels of correlation even around the 1998–1999 Asian Financial crisis and the 2008 global financial crisis.

The evidence in Fig. 2 suggests that the emerging market returns respond less to each other and that across emerging markets portfolio diversification may yield higher gains to investors. This however, depends largely on identifying the ESMs that are least integrated.

Fig. 2 shows that although some countries are within the same geographic region, their equity returns respond less to each other; this is particularly so among the African markets. Examples are Mexico and Jamaica, Ivory and Nigeria, Ivory Coast and South Africa, South Africa and Zambia, and India and Singapore. This evidence appears consistent with the observation by García-Herrero et al. (2009) and Alagidede (2010) that countries in the same geographic region may exhibit low level of financial market integration if there is limited economic activity between them, low level of market liquidity, and limited cross border investment flow, weak regulatory system and inadequate market infrastructure.

5.3. Factors driving emerging markets conditional correlations

Table 4 presents the correlations between the predictive variables in Eq. (4). This is important in identifying potential multicollinearity problems. Highly correlated predictive variables could introduce multicollinearity problems with significant implications

Table 4
Correlation between predictive variables.

	CACC	FDI	VTRAD	MCAP	OREXP	WREXP	HIEXP	ORIMP	WRIMP
Current Account (CACC)	1.000								
FDI to GDP (FDI)	0.522	1.000							
Value Traded to GDP (VTRAD)	0.455	0.691	1.000						
Market Capitalization to GDP (MCAP)	0.336	0.572	0.802	1.000					
Exports from Outside Region (OREXP)	0.322	0.559	0.581	0.378	1.000				
Exports to within Region (WREXP)	-0.240	-0.212	-0.186	-0.204	0.001	1.000			
Exports to High Income Countries (HIEXP)	-0.184	-0.082	-0.036	0.068	-0.197	-0.275	1.000		
Imports from Outside Region (ORIMP)	0.087	0.288	0.381	0.290	0.604	-0.052	0.051	1.000	
Imports from within Region (WRIMP)	-0.255	-0.164	-0.287	-0.289	-0.065	0.585	-0.047	-0.261	1.000
Imports from High Income Countries (HIIMP)	-0.108	0.009	0.142	0.147	-0.006	-0.061	0.727	0.022	-0.226

This Table presents the correlations between the predictive variables of the conditional correlations amongst the emerging markets.

for the reliability of the results from the estimation of Eq. (4). Table 4 shows that the correlations between the predictive variables are less than 0.6 excepting the correlations between Value Traded to GDP and foreign direct investment to GDP (0.69), Market Capitalization to GDP and Value Traded to GDP (0.80) and imports and exports from high income countries (0.73). Table 4 indicates that multicollinearity does not have any significant impact on the results from the estimation of Eq. (4).

We estimate various restricted versions of Eq. (4) and presents the results in Table 5. The estimation is done with data for 20 countries and 15 annual observations for each country *i*. We find the yearly average of the emerging market correlation of each country to ensure consistency between its frequency and the frequency of the predictive variables.

Table 5 indicates statistically significant coefficients for all the predictive variables excluding the coefficients on foreign direct investment to GDP, imports from emerging markets within the geographic region of the importing country (WRIMP) and exports to emerging markets outside the geographic region of the exporting country (OREXP) in univariate models. The findings indicate that the predictive variables describe time variations in the within emerging markets integration. It also shows the usefulness of economic engagement in driving financial market integration which is consistent with studies such as Campa and Fernandes (2006); García-Herrero et al. (2009), Bekaert and Harvey (1995), Bracker et al. (1999), and Bekaert et al. (2011), and Boamah et al. (2017a,b).

In various two factor models, Table 5 shows that current account balance (CACC) is significant in all cases when it is included in a model with VTRAD or MCAP. Similarly, MCAP is significant in all model setups; however, VTRAD is significant only when it is paired with MCAP. Table 5 shows statistically significant coefficients for MCAP and CACC (excluding one case) in all versions of Eq. (4). Similarly, the coefficient on VTRAD is statistically insignificant in only few versions of the model. The MCAP coefficient implies that the larger emerging markets exhibit higher within emerging markets integration relative to the smaller emerging markets. Similarly, the positive VTRAD coefficient is an indication that the most liquid emerging markets tend to be more integrated relative to illiquid markets.

The MCAP and VTRAD findings corroborate the evidence by García-Herrero et al. (2009) and Boamah et al. (2017a,b). Boamah et al. argue that the relatively large and liquid African emerging markets are the most integrated globally. Similarly, Garcia-Herrero et al. note that limited market liquidity undermined cross-border capital flows within the Asian markets resulting in a lower degree of correlations among them. They argue that their findings are robust even in the presence of higher degree of economic activities among Asian markets. Hearn (2014) and Lehkonen (2015) observe that the quality of regulation and market liquidity impact on financial market integration via their influence on cross-border investment flows and market liquidity. The evidence shows that the larger and liquid emerging markets may be most opened to other emerging and developed markets.

Table 5 shows that improving current account balance is associated with declining degree of integration within emerging markets. This may be explained by the relationship between domestic assets creation, current account, investment flows and the degree of domestic financial sector development. For instance, Clarida (2005) and Mendoza et al. (2006) suggest that financial intermediation and financial sector development leads to domestic investment, as such a deterioration of the current account. Current account deterioration should thus be associated with higher degrees of integration. A rising current account surplus may imply a net trade surplus or a slowdown in capital inflows to the emerging markets. This infers that a surge in the current account balance may be associated with limited domestic assets creation and investment which may attract lesser amount of foreign capital to a given country.

Declining capital inflows such as portfolio and direct investments expectedly should reduce financial market integration. A rising inflow of foreign capital could lead to an increase in financial market integration, and an increase in current account deficit. For instance, Obstfeld (1999) and Chinn and Prasad (2003) observe a significant and negative relationship between inflow of foreign capital such as aid to developing countries and current account deficits. Foreign capital inflows permit countries to finance larger current account deficits.

Table 5 shows further that the coefficients of the emerging markets trade factors are mostly insignificant. However, the coefficients on export to and import from high income countries are mostly significant statistically in various versions of the model. The findings suggest that imports from developed countries is the most significant trade variable influencing emerging markets correlations with each other. This infers that the emerging markets are less economically engaged with themselves relative to their economic engagement with the developed markets. The importance of imports from high income countries relative to exports to high

income countries in describing the correlation between emerging markets may reflect the fact that the emerging markets are mostly net importers from the high income countries.

An interesting question is, why would trade with the high income countries drive the correlation between emerging markets equity returns, whereas, within emerging markets trade impact less on emerging markets equity return correlations? Most likely, the rising co-movements between each of the emerging markets and the high income economies arising from the high economic activities between emerging and the developed markets is reflected in the correlations between the emerging markets. That is, the correlations between the emerging market returns are a product of their separate correlations with the high income countries equity returns. The correlations among emerging markets are mostly derived from their respective correlations with the high income countries. The positive coefficients of the high income countries trade variables are supportive of this view.

An alternative explanation is that markets move together in times of crisis and that during the East Asian financial crisis of the late 1990s and the 2008 global financial crisis all the emerging and high income markets increased in cross-market correlation. However, Fig. 2 is less supportive of this argument. The Figure shows that only few emerging markets exhibit increased correlations with other emerging markets around the crisis periods. Similarly, the positive high income countries trade coefficients do not support this opinion; global trade involving the emerging markets collapsed around the crisis period, thus negative trade coefficients are expected during the crisis periods.

6. Conclusions

The study examined the correlation between emerging market equity returns by relying on a dynamic conditional correlation approach. It also explored the impact of capital market development and trade on the co-movements between emerging markets. The effects of trade with developed markets, emerging markets within the geographic region and outside the geographic region of a given country were separately explored. Evidence is provided that trade with the high income countries is more important than trade among emerging markets in driving within emerging markets integration. The evidence suggests that the emerging markets are less economically engaged with each other.

The paper finds further that current account balance is negatively correlated with within emerging markets co-movements. These findings suggest that less developed capital market infrastructure and the inability of emerging markets to create domestic assets inhibits the global integration of emerging markets. The paper shows that the within emerging markets integration increased around crisis periods suggesting that within emerging markets diversification gains may be minimal around crisis times. Country pair conditional correlations however, show that the surge in each of the emerging markets co-movement with the emerging markets portfolio around the crisis periods was driven by their co-movements with some few markets. The findings indicate that some emerging markets exhibit less degree of country pair integration even in crisis times and that across emerging markets investing offer investors significant diversification potential.

The findings show that it is important for policy makers in emerging markets to create the necessary environment for businesses to thrive and to convert domestic savings into domestic assets and investments in order to attract foreign capital into their economies. Surplus current account balance may imply that the country have limited domestic assets or have limited capability to create domestic assets and investments. It is important for emerging market policy makers to improve on their domestic financial markets, enhance their capital market infrastructure and open up their current account. However, efforts should be made to enhance the resilience of their economies to global financial crisis since the emerging markets largely respond appropriately to global events emanating from both the developed and emerging markets. Policies that will enhance trade among emerging markets should be pursued.

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