



## Foreign Direct Investment, International Trade and Financial Development in BRICS-T Countries: A Bootstrap Panel Causality Analysis

Serkan Sahin<sup>a</sup>

**Abstract:** *The aim of this paper is to investigate, within a Bootstrap panel causality approach, the interactions among foreign direct investment (FDI), international trade and financial development in BRICS-T countries (Brazil, Russia, India, China South Africa and Turkey). While the effect of foreign direct investment on economic growth is well documented, the consequences of FDI on financial development have not received as much attention. Previous studies have recognized that FDI is a crucial source of financing especially for emerging economies, though the benefit of FDI to recipient country is ambiguous. Furthermore, the number of previous studies examining the causal linkage between international trade and financial development is also limited. Besides, examining the associations among these factors, this study also investigates the joint effect of FDI and international trade on financial development in these countries. Empirical findings from a bootstrap panel causality approach indicate that FDI induce financial development in Brazil, Russia, and China. In addition, international trade promotes financial market development in Brazil, Russia and South Africa. Empirical findings also indicate that financial development stimulates international trade in Brazil, India and Turkey. Finally, it is found in this study that not only international trade stimulates FDI, but also FDI induce international trade in India and Turkey.*

**Keywords:** Financial Development, FDI, International Trade, Bootstrap Panel Causality, BRICS-T Countries

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### 1. Introduction

While the consequences of financial development on economic growth are well documented, the effect of economic factors on financial development has not received as much attention. However, the number of studies examining the effects of international trade and foreign direct investment on the development of financial markets has grown leaps and bounds in the last two decades, since there are many motivations to expect causal association between these indicators.

First, as a cheap and an efficient way of transferring applied science and skills from developed countries to developing countries, FDI induce an increase in the volume of the funds in financial markets, hence amplifying the liquidity and promoting the trade of financial instruments and contracts (Levine, 1997, Unctad, 1999; Desai et al., 2006; Mendoza et al., 2007). Furthermore, inward FDI flows forces local financial firms to support financial reforms and liberalization which in turn boost the financial system (Rajan & Zingales, 2003; Kholdy & Sohrabian, 2008). On the other hand, financial reforms, liberalization and reduced level of information asymmetry attract foreign investors more in financial markets (Unctad, 1998; Asiedu,

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<sup>a</sup> Asst. Prof., PhD., Kahramanmaraş Sutcu Imam University, Faculty of Economics and Administrative Sciences, Department of Business Administration, Kahramanmaraş, Türkiye, serkansans@hotmail.com (ORCID ID: 0000-0002-1927-1092)

2006; Alfaro et al., 2008). In particular, more financially developed countries attract higher FDI since FDI increase with fewer restrictions on payments as well as higher degree of financial political stability (Noman & Uddin, 2011; Motelle, 2011). It is also argued that financial incentives are much more effective in attracting FDI than fiscal incentives (Miskinis & Mikneviute, 2011).

However, other studies also theoretically argue that the association between financial development and FDI is ambiguous. Though, FDI can boost the well-functioning of financial markets via the eased access of external financing especially in financially vulnerable sectors, it may also negatively affect financial development because of the disintegration and indirect competition effects (Desbordes & Wei, 2014). Instead of financing via capital markets, FDI can be used by firms which are in need of capital (Hausmann & Fernandez-Arias, 2000; 2001). In this manner, FDI is a hampering factor of financial development.

Together with openness to capital flows, international trade stimulates new entries of financial intermediaries into the financial system. In this manner, international trade can boost the well-functioning of the financial system especially in developing economies (Rajan & Zingales, 2003). At the one extreme, liberalization of international trade contributes to the openness of an economy (Mottaleb & Kalirajan, 2010). In particular, a free market economy is more likely to engage in higher FDI flows. At the other extreme, it is argued that international trade is seen as substitute of FDI in many cases (Markusen, 1984; Shatz & Venables, 2000). This point of view mainly depends on the tariff jumping hypothesis of Jordaan (2004) who argues that multinational firms may decide to set up their branches in host countries to overcome trade barriers, strict product specific rules and trade costs such as vehicle ownership and use, travel costs, fuel externalities, land use and equity impacts (Dunning, 1980; Liargovas & Skandalis, 2012). In this manner, trade liberalization limits the amount of external financing in host countries by stimulating the movement of goods and services.

The majority of the studies focusing on the association between FDI, financial development and economic growth mainly investigate relation between FDI on economic growth (Bekaert et al., 2005; Alfaro et al., 2010; Urbsiene & Sendriy, 2014). However, there are few studies examining in-depth association between FDI and financial development especially in emerging economies (See, Alfaro et al, 2003; Nasser & Gomez, 2009; Sghaier & Abida, 2013; Desbordes & Wei, 2014).

In recent years, the focus on BRICS countries has grown leaps and bounds since these countries have enormous growth potential for the next two decades. It is expected that BRICS-T countries will overtake the G7 countries in the near future. Hence, the causal linkages between FDI, international trade and financial development have great importance in this process. As far as I know, there is no study examining the in depth relation among financial development, international trade and FDI in BRICS-T countries. However, there many studies examining the interactions among FDI, financial development and economic growth (See, Hermes & Lensink, 2003; Kandır et al., 2007; Lee & Chang, 2009; Felek et. al, 2018) and the relation between FDI and other factors such as intellectual property, patents and R&D (See, Tanaka & Iwaisako, 2014; Korhan & Çağrı, 2017). There are also studies investigating the FDI for BRICS-T countries (See, Helhel, 2017). However, it is seen causal associations among FDI, financial development and international trade is not well documented in literature. This paper enriches the limited literature examining financial development-FDI relation in BRICS-T countries. This paper also accounts for the consequences of international trade on FDI and financial development.

The rest of the paper is structured as follows. Literature about financial development, investment and international trade is given in Section 2. Data and the methodology are explained in Section 3. Empirical results are discussed in Section 4. Finally concluding remarks are provided in Section 5.

## **2. Financial Development, Investment and Trade: A Brief Literature Review**

FDI is expected affect financial development positively through technology transfer and introduction of new process. In stimulating the competition inward FDI may increase the productivity of firms in host countries (Ponikvar & Kejzar, 2014). In addition, as an external financing method, FDI can contribute to the capital formation in host economies theoretically (Alfaro et al., 2009). However, empirical results are not fully supportive of these theoretical arguments. Though, there is no unique conclusion for the effects of FDI on

financial development, it seems that developed markets seem to take more advantage of FDI (Alfaro et al, 2003). However, results for the developing markets are much more controversial. Nasser and Gomez (2009) find that there is positive association between FDI and financial development. Moreover, examining the panel data of Tunisia, Morocco, Algeria and Egypt for the time period 1980-2011 Sghaier and Abida (2013) find that there is positive correlation between financial development and FDI using Generalized Method of Moment (GMM). Using the data of 67 developed and developing countries, Desbordes and Wei (2014) conclude that financial development is a motivating factor for inward FDI flows specifically for the sectors that have limited access to finance sectors. However, it is also concluded that it reduces the volume of inward FDI in financially less developed sectors. Using the data of 97 countries, Dutta and Roy (2011) find that financial development is positively related with FDI up to a assured level, however, the relation become negative beyond that level. Using VAR and modified granger casualty models, Nasir et al. (2017: 228) cannot find any causal interaction between FDI and financial development in Saudi Arabia.

In another study, using panel vector autoregressive approach Fauzel (2016: 367) found that there is bidirectional causality between FDI and financial development for Antigua and Barbuda, Aruba, Bahamas, Bahrain, Belize, Comoros, Cyprus, Dominican Republic, Dominica, Grenada, Guyana, Jamaica, St Lucia, St Vincent and Grenadines, Malta, Papua New Guinea, Maldives, Mauritius (island economies). In their study, Shah et al. (2015) found causality from FDI to financial development for Indonesia, Malaysia, the Philippines, Singapore, and Thailand (ASEAN countries) in the short run. However, they also reported supporting evidence for the bidirectional causality between FDI and financial development for the period from 2005 to 2013. Moreover, using Dynamic panel data approach for the period 2002 to 2011 Samimi et al. (2013: 1285) reported supportive evidence for the causal linkage between FDI and financial development for the countries in Middle East and North Africa (MENA) region. Gebrehiwot et al. (2016: 64) reported causal interaction between FDI and financial development for the countries in Sub-Saharan African region for the period 1991-2013 using two step panel regression and Granger causality analysis. Desbordes and Wei (2017: 1) also reported supportive evidence for a causal interaction between FDI and financial development.

Evidence on the linkage within international trade and inward FDI flows is inconclusive. Various studies find that international trade promotes inward FDI flows in host countries (Asiedu, 2002; Onyeiwu & Shrestha; 2004; Ang, 2008; Mottaleb & Kalirajan; 2010). However, it is also found that international trade restrains the volume of inward FDI flows (Wheeler & Mody, 1992; Brainard, 1997).

Studies examining the linkage between international trade and financial development are also limited and mixed. Though, some studies report causality running from international trade to financial development (Law, 2009; Baltagi et al., 2009), other studies find causality in opposite direction (Beck, 2002; Kar et al., 2014) whereas some of them find bidirectional causality (Svaleryd & Vlachos, 2002). Kim et al. (2011) find that relation between these indicators is positive in the long run, whereas negative in the short run. Examining the relation between export, import and financial development for the time period from 1990-2011, Zhao (2017: 987) found a U-shaped relation between these factors for 108 countries analyzed. In other words, they found evidence of positive relation between exports and financial development for the countries with less developed financial markets, whereas, they found inverse relationship for the countries with developed financial markets.

### 3. Data and Research Methodology

It is highly possible that spillover effect is generated due to international trade and financial integration across countries. In order to account for this effect, cross sectional dependency test should be applied in the very first step of the panel data analysis (Kar et al., 2011; Menyah et al., 2014). In testing the cross sectional dependency, Peseran (2004) argued two different cross sectional dependency test. The first one is the Breusch and Pagan (1980) suggest LM statistics which is estimated as follow:

$$LM_{BP} = T \sum_{j=1}^{N-1} \sum_{k=i+1}^N \hat{\rho}_{jk}^2$$

where  $\hat{\rho}$  is the Pearson correlation coefficient of the residuals which is estimated as follows.

$$\hat{\rho} = T \frac{\sum_{t=1}^T e_{jt} e_{kt}}{(\sum_{t=1}^T e_{jt}^2)^{1/2} (\sum_{t=1}^T e_{kt}^2)^{1/2}}$$

The Breusch and Pagan (1980)  $LM_{BP}$  test gives consistent estimations for the cases when  $T > N$ . However, Pesaran (2004) suggests the below scaled LM statistics ( $CD_{LM}$ ) for the samples when both cross sectional and time extension is large ( $T > N, N > T$ ).

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{j=1}^{N-1} \sum_{k=i+1}^N (T \hat{\rho}_{jk}^2 - 1)$$

Pesaran (2004) argue that the  $CD_{LM}$  test gives inconsistent results when  $T$  is relatively small and  $N$  is relatively large. Pesaran (2004) suggests a generalized version of the test which accounts for these cases. The aforementioned  $CD$  statistics is calculated as below (Pesaran, 2004);

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{j=1}^{N-1} \sum_{k=i+1}^N \hat{\rho}_{jk} \right)$$

where  $\hat{\rho}_{ij}$  is the estimated pairwise interactions of the residuals. Pesaran et al. (2008) also suggest an improved interpretation of this test in order to account for the cases where both cross sectional and time dimension is fixed. This test is referred as ( $LM_{adj}$ ) and estimated as below (Pesaran et al., 2008):

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}} \sum_{j=1}^{N-1} \sum_{k=i+1}^N \frac{(T-r) \hat{\rho}_{jk} - \mu_{Tjk}}{v_{Tjk}}$$

Where  $r$  is the number of regressors. The estimated statistics are shown in Table 1.

**Table 1.** Cross Sectional Dependency

Indicators/Tests	$LM_{BP}$	$CD_{LM}$	$CD$	$LM_{adj}$
DCP	72.50***	10.50***	7.65***	5.79***
M2	99.22***	15.38***	9.33***	9.21***
MCAP	37.63***	4.13***	1.70**	4.31***
SMT	49.72***	6.34***	1.62*	1.53*

<sup>1</sup>Superscripts \*\*\*, \*\*, \* represent significance at 1, 5, and 10% respectively

It is seen in Table 1 that cross sectional dependency for all financial development indicators exist. These initial findings indicate that spillover effect is generated via the information transmission across BRICS-T countries.

There are many advantages of using panel data sets. First, panel data improves the efficiency of the estimates via decreasing multicollinearity and increasing degrees of freedom. Panel data also enables pooling the data and controlling for the individual differences. Another advantage is that it is much easier to control over the unobserved/omitted variables in panel setting (Hsiao et al., 1995; Baltagi & Song, 2006).

In this study, panel causality methodology of Kónya (2006) is used to examine the causal associations between these factors. The rationale behind preferring this approach is that it considers the cross sectional dependency. In other words, this approach enables us to account for the interaction between cross sectional units. Moreover, this approach can be used irrespective of the time series features of the indicators (Kónya, 2006). Since this approach accounts for the residual dependence, the validity of the tests are approved. Moreover, since levels of variables are used there is no loss of information in system estimation which is represented as follow:

$$\begin{aligned}
y_{m,1,t} &= \alpha_{1,1} + \sum_{k=1}^{jky_1} \beta_{1,1,k} y_{m,1,t-k} + \sum_{k=1}^{jkkx_1} \phi_{1,1,k} x_{1,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{1,1,k} z_{1,t-k} + \varepsilon_{1,1,t} \\
y_{m,2,t} &= \alpha_{1,2} + \sum_{k=1}^{jky_1} \beta_{1,2,k} y_{m,2,t-k} + \sum_{k=1}^{jkkx_1} \phi_{1,2,k} x_{2,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{1,2,k} z_{2,t-k} + \varepsilon_{1,2,t} \\
y_{m,2,t} &= \alpha_{1,N} + \sum_{k=1}^{jky_1} \beta_{1,N,k} y_{m,N,t-k} + \sum_{k=1}^{jkkx_1} \phi_{1,N,k} x_{N,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{1,N,k} z_{N,t-k} + \varepsilon_{1,N,t} \\
x_{1,t} &= \alpha_{2,1} + \sum_{k=1}^{jky_1} \beta_{2,1,k} y_{m,1,t-k} + \sum_{k=1}^{jkkx_1} \phi_{2,1,k} x_{1,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{2,1,k} z_{1,t-k} + \varepsilon_{2,1,t} \\
x_{2,t} &= \alpha_{2,2} + \sum_{k=1}^{jky_1} \beta_{2,2,k} y_{m,2,t-k} + \sum_{k=1}^{jkkx_1} \phi_{2,2,k} x_{2,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{2,2,k} z_{2,t-k} + \varepsilon_{2,2,t} \\
x_{N,t} &= \alpha_{2,N} + \sum_{k=1}^{jky_1} \beta_{2,N,k} y_{m,N,t-k} + \sum_{k=1}^{jkkx_1} \phi_{2,N,k} x_{N,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{2,N,k} z_{N,t-k} + \varepsilon_{2,N,t} \\
z_{1,t} &= \alpha_{3,1} + \sum_{k=1}^{jky_1} \beta_{3,1,k} y_{m,1,t-k} + \sum_{k=1}^{jkkx_1} \phi_{3,1,k} x_{1,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{3,1,k} z_{1,t-k} + \varepsilon_{3,1,t} \\
z_{2,t} &= \alpha_{3,2} + \sum_{k=1}^{jky_1} \beta_{3,2,k} y_{m,2,t-k} + \sum_{k=1}^{jkkx_1} \phi_{3,2,k} x_{2,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{3,2,k} z_{2,t-k} + \varepsilon_{3,2,t} \\
z_{N,t} &= \alpha_{3,N} + \sum_{k=1}^{jky_1} \beta_{3,N,k} y_{m,N,t-k} + \sum_{k=1}^{jkkx_1} \phi_{3,N,k} x_{N,t-k} + \sum_{k=1}^{jkkz_1} \varphi_{3,N,k} z_{N,t-k}
\end{aligned}$$

Where  $x_1$  represent to FDI,  $z_1$  indicates to international trade,  $y_m$  is the financial development indicator with the subscripts  $m$  referring to DCP, M2, MCAP and SMT. Index  $k$  is the lag length,  $t$  ( $t = 1, \dots, T$ ) is the time period,  $N$  ( $i = 1, \dots, N$ ) is the number of cross section units. In this equation system, if all of the  $\beta_2$ 's equal to zero but not all  $\phi_{1,i}$ 's jointly equal to zero, there is causality from  $X$  to  $Y$  for country  $i$ . There is causality running from  $Y$  to  $X$ , if entire  $\phi_{1,i}$ 's jointly equal to zero but at least one of the  $\beta_2$ 's is not equal to zero. There is one-way causality running from  $Z$  to  $Y$ , if all of the  $\beta_3$ 's equal to zero but at least one of the  $\phi_{1,i}$ 's is not equal to zero. If  $\phi_{1,i}$ 's jointly equal to zero but at least  $\beta_3$ 's is not equal to zero, there is causality from  $Y$  to  $Z$ . There is bidirectional causality between  $X$  and  $Y$ , if at least one of the  $\beta_2$ 's and one of the  $\phi_{1,i}$ 's don't equal to zero, and if all  $\phi_{1,i}$ 's and  $\beta_2$ 's equal to zero this means there is no causality between these factors. There is bidirectional causality between  $Z$  and  $Y$ , if none of the  $\beta_3$ 's and  $\phi_{1,i}$ 's equal to zero, and no causal association exist between  $Z$  and  $Y$ , if all  $\phi_{1,i}$ 's and  $\beta_3$ 's jointly equal to zero.

Though there is no rule of thumb in determining the maximal lag length, it is suggested one should refrain from setting too many and too few lags since it may cause specification error and omitted variables problem respectively. Hence, it is assumed that lag length varies between 1 and 4 for the annual data, and lag length that maximizes the Schwartz Information Criterion (SIC) is preferred.

The annual data of BRICS-T countries (Brazil, Russia, India, China, South Africa and Turkey) is retrieved from the WDI database. 1993-2013 period is covered since more recent data for the selected countries is not available on the database. It is seen in literature that there are various measures of financial development (Bettin & Zazzaro, 2011: 513). The financial development indicators used in this study are listed in Table 2.

**Table 2: Proxies of Financial Development**

Indicators	Variable
Domestic credit to private sector/GDP	DCP
Money and quasi money to GDP	M2
Market capitalization to GDP	MCAP
Stock market trade to GDP	SMT

In addition, international trade (IT) is measured as [(export + import)/GDP]. FDI is proxied by inward foreign direct investment as percentage of GDP. The natural logarithms of all variables which are denoted as LNDCP, LNM2, LNMCAP, LNSMT, LNIT and LNFDI are used. The empirical results are given in section 4 of this study.

#### 4. Empirical Findings

Having established that cross sectional dependency exists; panel causality methodology of Kónya (2006) which accounts for this issue is employed. This methodology mainly depends on Wald statistics and bootstrap critical values for each of the cross section units. To conserve space, Table 3 only reports the significant causal linkages found in panel Granger causality analysis (Please see the bootstrap estimations in Appendix A). The causality between “A to B” indicate the null hypothesis of no causality running from “A” to “B is examined”. The notation  $\rightarrow$  is donated to indicate the causality running from “A” to “B” and  $\leftarrow$  for the causality from “B” to “A” and  $\leftrightarrow$  for the bidirectional causality.

**Table 3.** Bootstrap Panel Causality Results

Countries	DCP	M2	MCAP	SMT
<b>Panel A: Causality between FDI and FD</b>				
Brazil	None	$\rightarrow$	None	None
Russia	None	None	$\leftrightarrow$	None
India	None	None	None	None
China	$\rightarrow$	None	None	None
South Africa	None	None	None	None
Turkey	None	None	None	None
<b>Panel B: Causality between IT and FD</b>				
Brazil	$\rightarrow$	$\leftrightarrow$	None	None
Russia	None	None	$\rightarrow$	None
India	$\leftarrow$	None	None	None
China	None	None	None	None
South Africa	$\rightarrow$	None	None	None
Turkey	None	$\leftarrow$	None	None
<b>Panel C: Causality between IT and FDI</b>				
Brazil	None	None	None	None
Russia	None	None	None	None
India	$\leftarrow$	$\rightarrow$	None	$\leftrightarrow$
China	None	None	None	None
South Africa	None	None	None	None
Turkey	$\leftarrow$	$\rightarrow$	$\rightarrow$	None

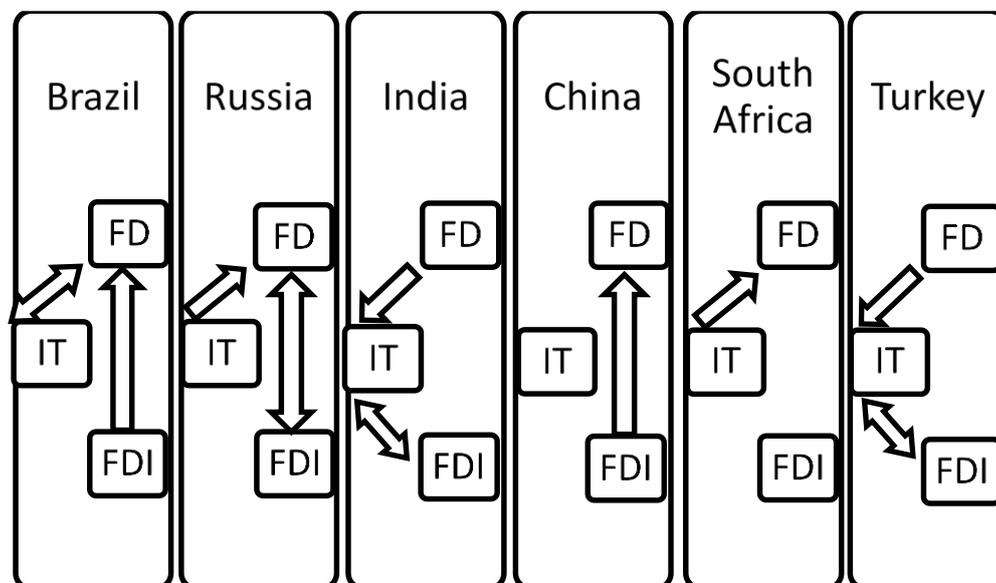
It is seen in Table 3 that the causal linkages among the variables are dominated by cross sectional units and type of financial development indicators used. In particular, panel causality results show that FDI improves the estimates of development of financial markets in Brazil, Russia and China. In other words, FDI boost financial development in these countries. Findings for Russia imply that not only FDI promote financial development but also financial development foster FDI in this country. As one of the developing countries, it seems that Russia is an attractive investment destination. There are many underlying rationale attracting FDI for developing countries such as low-cost unskilled labor force, low transport and communication costs, non-tariff barriers and high growth potential of the market. It is also found that there is no causal association running from FDI to financial development in India, South Africa and Turkey. In other words, FDI is not a crucial factor to amplify development of financial markets in these countries.

The findings for the linkage between international trade and financial market development show that international trade boost financial development in Brazil, Russia and South Africa. In this manner, international trade triggers financial development in these countries. These are similar to the results of many studies in literature (See, Do & Levchenko, 2007; Law, 2009; Baltagi et al., 2009). However, opposite

unidirectional causality is also found for India and Turkey, which means that financial development boost international trade in these countries. This implies that the more a market is developed, the more it accomplishes to export goods bound to financial markets. This result is consistent with those of Beck, 2002 and Kar et al., 2014. Results for Brazil also provide evidence of bidirectional causality meaning that not only international trade boost financial development but also financial development enhances international trade in this country. This implies that financial development is a motivating factor for trade in Brazil. It is seen that there is causal association between international trade and financial development in China.

Findings for FDI and international trade provide evidence that international trade increases the forecasting power of FDI in Turkey and India. This indicates that international trade induces FDI in Turkey and India. This finding is consistent with the evidence provided by Kravis and Lipsey, 1982; Asiedu, 2002; Ang, 2008; Mottaleb and Kalirajan; 2010. Moreover, it seems that FDI also cause international trade in Turkey and India. This is a foregone conclusion for developing countries since it is expected that increased investment in production will raise production and export of goods. In India, it seems that this causal association is bidirectional when stock market trade (SMT) is the financial development indicator. In other words, FDI foster international trade and international trade improve the forecasts of FDI in India. The empirical findings can be summarized in Figure 1 below. In this figure, one way arrow indicates causality running from one factor to another, whereas two way arrow shows bidirectional causality between the factors in essence. Though the results seem to be mixed, it is seen that FDI induce financial development in all cases except for India and Turkey. In addition, it seems that financial development also attracts FDI in Russia. This indicates that financial development is a motivating factor in attracting FDI in Russia, whereas there is no this kind of relation for other countries. Moreover, international trade supports the development of financial markets in Brazil, Russia and South Africa. However, financial development stimulates international trade in Brazil, India and Turkey. Hence, it is seen that there is bidirectional relation between international trade and financial development in Brazil. In assessing the association between international trade and FDI, it is seen that causal linkage exists only in India and Turkey.

**Figure 1.** Causal Interactions among Financial Development, FDI and International Trade in BRICS-T Countries



The joint effect of FDI and international trade on financial development is also investigated in this study. Table 4 only reports the significant causal linkages found in panel Granger causality analysis (Please see the bootstrap estimations in Appendix B). The causality between “A to B” indicate the null hypothesis of no causality running from “A” to “B” is examined”. The notation  $\rightarrow$  is donated to indicate the causality running from A” to “B”.

**Table 4.** Bootstrap Panel Causality Results for the Joint Effect of International Trade and Foreign Direct Investment on Financial Development

Countries	DCP	M2	MCAP	SMT
Brazil	None	None	None	None
Russia	None	None	→	None
India	None	None	None	None
China	→	None	None	None
South Africa	→	None	None	None
Turkey	None	None	None	None

The empirical findings indicate that FDI and international trade jointly cause financial development in China, Russia and South Africa. These results indicate that though international trade does not cause FDI itself, together with FD it affects FDI in Russia, China and South Africa. This implies that international trade is a transmission mechanism for these countries.

### 5. Conclusions

Causal associations between FDI, international trade and financial development in BRICS-T countries are examined in this paper. Besides examining the relation between FDI and financial development in emerging economies, this study also investigate the effect of international trade on financial development and FDI. In order to examine the causal associations between these factors four different proxies of financial development are used. It is seen that results are country specific.

For Brazil, it is seen that FDI triggers financial development. In other words the capital raised by foreign investors help to promote financial development in this country. In addition, results indicate that not only financial development boost international trade but also international trade foster financial development in this country.

For Russia, FDI is a crucial factor for financial development. Moreover, it is seen that financial development is motivating factor in attracting inward FDI in this country. It is also found that international trade boost financial development in this country. Hence, international trade and FDI are both significant factors in supporting financial development in Russia.

For India, it is recognized that there is no interaction between financial development and FDI. However, it is also seen that financial development triggers international trade in this country. Moreover, international trade and FDI boost each other in India.

For China, there is only one suggested relation between these factors, namely the interaction between FDI and financial development. It is recognized that similar to Brazil and Russia FDI fosters financial development in China.

For South Africa, similar to China, there is only one remarkable interaction between international trade and financial development. In particular, international trade is a significant factor for financial development in this country.

For Turkey, similar to India and South Africa, there is no interaction between FDI and financial development. However, financial development fosters international trade and international trade boost FDI in this country. FDI also triggers international trade in Turkey.

Though, the results are country specific, some common points are recognized. In particular, it is seen in this study that FDI induce financial development in Brazil, China and Russia. However, it is recognized that there is no causal association between FDI and financial development in India, South Africa and Turkey. In this manner, policy makers in Brazil, China and Russia may take measures to attract FDI which contribute to the development of these emerging economies.

Except for the China, it is seen that international trade trigger financial development and vice versa in BRICS-T countries. This result is consistent with many previous studies (See, Do and Levchenko, 2007; Law, 2009; Baltagi et al., 2009). The effect of international trade on financial development is an expected outcome since international trade can contribute to the development of the financial markets via the increasing intermediation. It is also seen that export and import decisions are also mainly driven by the development of financial markets.

It is also seen that FDI and international trade is also associated in India and Turkey. This implies that investment is directed to the financially developed markets. This result is consistent with those of Asiedu, 2002; Onyeiwu and Shrestha; 2004; Ang, 2008; Mottaleb and Kalirajan; 2010.

Aside from servicing a gap in the literature, this study provides valuable information for the policy makers dealing with the development of financial markets in emerging economies. It is highly recommended for future studies to examine financial development with the inclusion of additional macroeconomic variables.

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Appendix

Appendix A

**Financial Development (DCP) and Foreign Direct Investment (FDI)**

Countries	H <sub>0</sub> : FDI does not cause DCP				H <sub>0</sub> : DCP does not cause FDI			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	0.14	23.26	12.64	8.59	1.51	24.26	13.35	9.31
Russia	6.65	21.40	11.00	7.42	2.08	19.64	10.40	7.06
India	0.13	19.19	9.87	6.63	1.00	22.50	11.40	7.83
China	12.21**	16.23	8.58	5.91	0.12	23.78	12.84	8.88
South Africa	4.36	20.22	10.23	6.69	3.16	17.58	9.06	6.14
Turkey	3.77	16.22	8.85	6.02	0.21	24.18	12.73	8.71

<sup>2</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Financial Development (MCAP) and Foreign Direct Investment (FDI)**

Countries	H <sub>0</sub> : FDI does not cause MCAP				H <sub>0</sub> : MCAP does not cause FDI			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	0.31	19.12	10.37	7.02	0.46	20.16	10.76	7.40
Russia	15.53**	21.55	10.69	7.19	22.43**	25.24	13.23	8.94
India	0.23	19.13	9.43	6.32	0.24	20.16	10.49	7.25
China	0.32	24.70	12.71	8.60	0.62	22.34	11.97	8.16
South Africa	1.68	16.36	8.28	5.72	1.52	17.96	8.90	6.05
Turkey	0.22	17.16	8.57	5.68	2.39	15.58	7.49	5.44

<sup>3</sup> Note: All critical values depend on 10,000 bootstrap repetitions.

**Financial Development (SMT) and Foreign Direct Investment (FDI)**

Countries	H <sub>0</sub> : FDI does not cause SMT				H <sub>0</sub> : SMT does not cause FDI			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	5.88	25.88	13.47	9.24	0.17	23.49	12.29	8.34
Russia	2.28	20.88	10.798	7.30	4.38	27.24	14.82	10.33
India	0.69	18.61	10.05	6.81	5.21	22.40	12.91	8.82
China	5.29	23.51	12.29	8.38	0.15	23.02	12.72	8.81
South Africa	1.66	17.84	9.26	6.44	0.81	18.45	9.80	6.51
Turkey	0.40	19.01	9.90	6.83	0.75	15.42	8.14	5.41

<sup>4</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Financial Development (M2) and Foreign Direct Investment (FDI)**

Countries	H <sub>0</sub> : FDI does not cause M2				H <sub>0</sub> : M2 does not cause FDI			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	14.71**	21.45	11.07	7.56	1.87	20.73	10.94	7.13
Russia	1.44	20.21	10.59	6.89	2.87	24.86	13.65	9.33
India	3.43	17.94	8.92	5.93	0.89	23.23	12.50	8.77
China	1.33	14.63	7.72	5.29	0.12	24.52	12.54	8.65
South Africa	0.75	17.00	8.68	6.00	0.12	18.40	9.17	6.17
Turkey	2.72	19.47	9.77	6.71	5.89	18.97	9.93	6.81

<sup>5</sup> Note: All critical values depend on 10,000 bootstrap repetitions.

**Financial Development (MCAP) and International Trade (IT)**

Countries	H <sub>0</sub> : IT does not cause MCAP				H <sub>0</sub> : MCAP does not cause IT			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	0.98	18.08	9.52	6.70	0.43	22.28	12.00	8.28
Russia	11.06**	21.35	10.98	7.62	1.37	25.13	13.00	8.79
India	1.79	20.46	10.44	6.93	2.81	20.76	11.22	7.45
China	1.56	21.17	11.69	8.03	2.92	20.67	11.41	7.86
South Africa	0.95	18.63	9.70	6.63	3.26	20.31	10.89	7.44
Turkey	0.30	16.59	8.48	5.65	0.47	16.83	9.35	6.41

<sup>5</sup> Note: All critical values depend on 10,000 bootstrap repetitions.

**Financial Development (DCP) and International Trade (IT)**

Countries	H <sub>0</sub> : IT does not cause DCP				H <sub>0</sub> : DCP does not cause IT			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	15.39**	20.38	11.19	7.88	2.75	18.23	9.59	6.47
Russia	10.69	31.44	15.95	11.30	0.22	25.28	13.40	9.24
India	0.26	17.04	9.26	6.37	7.99*	21.52	11.15	7.52
China	5.15	18.80	9.38	6.46	1.66	21.57	10.64	7.11
South Africa	7.25*	19.58	10.16	6.80	2.28	7.22	10.68	20.59
Turkey	2.27	18.44	9.73	6.64	1.73	7.76	11.28	21.96

<sup>6</sup> Note: All critical values depend on 10,000 bootstrap repetitions.

**Financial Development (SMT) and International Trade (IT)**

Countries	H <sub>0</sub> : IT does not cause SMT				H <sub>0</sub> : SMT does not cause IT			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	5.61	22.55	13.05	9.04	0.18	23.30	12.97	8.68
Russia	2.18	25.00	13.18	9.11	2.56	24.67	12.91	8.74
India	0.37	20.08	10.92	7.22	2.19	18.69	10.75	7.41
China	5.60	23.54	11.97	8.35	4.45	21.08	11.27	7.85
South Africa	0.74	18.43	10.27	7.00	2.13	19.75	10.74	7.38
Turkey	4.10	18.42	10.38	6.29	0.24	17.22	9.16	6.26

<sup>7</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Financial Development (M2) and International Trade (IT)**

Countries	H <sub>0</sub> : IT does not cause M2				H <sub>0</sub> : M2 does not cause IT			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	12.61**	18.60	10.50	7.29	10.18**	19.94	9.92	6.81
Russia	2.22	27.28	14.45	9.85	0.24	24.74	13.38	9.15
India	0.18	14.63	7.69	5.32	7.91	21.40	12.06	8.38
China	2.92	17.58	9.33	6.08	0.66	23.82	12.06	8.56
South Africa	1.90	17.13	8.90	5.96	2.59	21.36	11.61	8.01
Turkey	1.39	17.81	9.10	5.98	7.12*	20.65	10.39	6.99

<sup>8</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Foreign Direct Investment (FDI) and International trade (IT) (Financial Development Indicator: M2)**

Countries	H <sub>0</sub> : IT does not cause FDI (FD indicator: M2)				H <sub>0</sub> : FDI does not cause IT (FD indicator: M2)			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	1.32	18.70	10.24	6.94	0.69	21.42	11.09	7.78
Russia	4.03	24.65	13.31	9.49	2.37	27.26	15.15	10.42
India	17.21**	21.17	11.41	7.80	0.14	19.78	10.00	6.56
China	0.32	20.75	10.99	7.19	0.42	20.02	11.32	7.82
South Africa	0.85	18.17	9.31	6.37	0.47	17.96	8.54	5.72
Turkey	21.57***	17.60	9.21	6.24	5.07	21.65	11.14	7.37

<sup>9</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Foreign Direct Investment (FDI) and International trade (IT) (Financial development indicator: SMT)**

Countries	H <sub>0</sub> : IT does not cause FDI (FD indicator: SMT)				H <sub>0</sub> : FDI does not cause IT (FD indicator: SMT)			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	0.45	19.90	10.93	7.47	0.59	22.52	12.11	8.50
Russia	0.77	29.83	16.79	11.72	0.27	20.01	10.01	6.65
India	22.30**	24.13	13.98	9.71	9.20*	20.37	11.37	7.68
China	0.25	23.07	12.76	8.86	0.57	23.38	12.63	8.58
South Africa	0.15	18.98	10.11	7.01	0.12	18.19	8.88	5.99
Turkey	1.25	15.46	7.96	5.50	0.57	20.17	10.46	7.24

<sup>10</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Foreign Direct Investment (FDI) and International Trade (IT) (Financial Development Indicator: MCAP)**

Countries	H <sub>0</sub> : IT does not cause FDI (FD indicator: MCAP)				H <sub>0</sub> : FDI does not cause IT (FD indicator: MCAP)			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	0.72	21.76	11.72	8.10	0.37	20.90	11.04	7.69
Russia	10.84	28.97	15.78	11.22	0.14	22.31	12.12	8.01
India	0.52	22.25	11.90	8.12	0.38	18.39	10.00	6.94
China	0.27	22.43	11.85	8.04	0.91	21.69	11.81	8.07
South Africa	3.14	16.76	8.41	5.82	0.12	14.77	8.09	5.72
Turkey	15.35**	17.71	9.37	6.24	0.28	18.14	10.60	6.34

<sup>11</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Foreign Direct Investment (FDI) and International Trade (IT) (Financial Development Indicator: DCP)**

Countries	H <sub>0</sub> : IT does not cause FDI (FD indicator: DCP)				H <sub>0</sub> : FDI does not cause IT (FD indicator: DCP)			
	Wald Test Stat.	Boots. Crit. Values			Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%		1%	5%	10%
Brazil	0.81	19.05	9.87	6.83	0.62	19.75	11.15	7.94
Russia	1.99	26.37	13.49	9.02	3.10	19.27	10.36	6.87
India	0.47	19.04	9.66	6.48	12.27**	19.56	9.71	6.52
China	0.81	18.74	9.76	6.56	0.60	22.69	11.97	8.04
South Africa	0.56	15.79	8.56	5.93	0.45	18.10	9.36	6.49
Turkey	1.94	20.380	10.32	7.06	8.65*	18.64	10.06	6.97

<sup>12</sup> Note: All critical values depend on 10,000 bootstrap repetitions

## Appendix B

**Causality Running from FDI and IT to Financial Development  
(Financial Development Indicator: DCP)**

H <sub>0</sub> : FDI and IT do not cause Financial Development (Financial Development Indicator: DCP)				
Countries	Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%
Brazil	7.19	21.07	11.70	7.99
Russia	4.92	21.72	11.37	7.56
India	0.12	15.70	8.42	5.80
China	15.05**	16.89	8.96	5.96
South Africa	8.67*	19.53	10.08	6.84
Turkey	3.98	17.11	8.37	5.60

<sup>13</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Causality Running from FDI and IT to Financial Development  
(Financial Development Indicator: MCAP)**

H <sub>0</sub> : FDI and IT do not cause Financial Development (Financial Development Indicator: MCAP)				
Countries	Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%
Brazil	0.27	17.93	9.67	6.67
Russia	15.56**	20.59	10.75	7.07
India	1.52	18.60	9.65	6.49
China	0.71	24.50	13.04	8.82
South Africa	1.08	17.28	9.33	6.46
Turkey	0.15	15.73	8.42	5.75

<sup>14</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Causality Running from FDI and IT to Financial Development  
(Financial Development Indicator: M2)**

H <sub>0</sub> : FDI and IT do not cause Financial Development (Financial Development Indicator: M2)				
Countries	Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%
Brazil	1.62	19.56	10.64	7.38
Russia	0.65	20.97	10.29	6.69
India	1.82	15.88	8.62	5.78
China	2.46	17.02	8.61	5.79
South Africa	2.19	16.79	8.49	5.72
Turkey	0.18	17.11	8.99	6.05

<sup>15</sup> Note: All critical values depend on 10,000 bootstrap repetitions

**Causality Running from FDI and IT to Financial Development  
(Financial Development Indicator: SMT)**

H <sub>0</sub> : FDI and IT do not cause FD (Financial Development Indicator: SMT)				
Countries	Wald Test Stat.	Boots. Crit. Values		
		1%	5%	10%
Brazil	8.84	22.98	13.17	9.10
Russia	3.85	22.20	12.01	7.89
India	0.30	18.11	9.35	6.36
China	0.65	22.01	12.33	8.56
South Africa	0.21	18.24	10.03	7.01
Turkey	3.99	20.26	9.69	6.50

<sup>16</sup> Note: All critical values depend on 10,000 bootstrap repetitions