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Spatial Interdependence Between Mongolia, China, and Russia: Impact on Mongolian Inward FDI and Sustained Economic Growth

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Abstract: *In addition to furthering the discussion on the determinants of foreign direct investment (FDI) in Mongolia, the paper at hand aims to primarily address the age-old question of whether being situated next to global economic powers alleviates, or hinders, your economic prosperity. In other words, are the developmental successes of your neighbors translated across borders to positively, or negatively, affect yours. Our results support the significance of the short- and long-run relationships between the variables of interest for Mongolia, ultimately accentuating their mutually reinforcing affiliations; thereby leading to policy implications, which are then briefly discussed. The main findings of the paper highlighted the enhancing impact Russia's economic growth has on FDI inflows to Mongolia; while contrary to popular belief, the economic growth of China was found to deter Mongolian inward FDI.*

Keywords: *Mongolia; China; Russia; FDI, sustained economic growth JEL classification: C32, F14, F21, F43, O19, O23*

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1. Introduction

The importance of a nation's ability to attract foreign direct investment (FDI) in the current age of globalization is not understated, as it - to a large extent - determines the capacity to which said nation can successfully compete in the global markets[1]; and thereby, improve the well-being and livelihood of its citizens. This is especially true for developing economies, such as Mongolia, as they are faced with debilitating borrowing constraints and inadequate tax income[2]; making FDI one of the most attractive and stable sources of capital flows[3], with some scholars even advocating its relatively positive impact on the host country's economic growth in the long-run[4]. The latter argument has been a primary reason for propelling the status of FDI to signify more than mere capital flows stemming from entrepreneurial interests and endeavors of multinational corporations (MNC), to a bundle of resources that meaningfully contributes to the host economy's long-term economic prospects. Moreover, considering its crucial role in the growth and development of economies, the propensity to attract FDI is increasingly serving as a mandate for the legitimacy of ruling authorities.

In the past two and half decades, the world has seen unprecedented levels of global FDI flows. By 2015, world-wide FDI inflows had increased to USD (United States Dollars) 1.8 trillion[5] from USD 0.2 trillion in 1990[6], the highest level reached since the global economic and financial crises of 2008 and 2009[7]. However, this growth was not equally distributed around the globe, nor did it improve the productive capacity for all countries[8]. Although many FDI determinants have been identified, their influences are seen to vary across countries and regions.

1 Chudnovsky & Lopez (1999).
2 Berg et al. (2013).
3 United Nations Conference on Trade And Development [UNCTAD] (2015).
4 Borenzstein et al. (1998).
5 UNCTAD (2016).
6 UNCTAD (1992).
7 UNCTAD (2016).
8 Ibid.

Nonetheless, the majority of the findings have wavered more towards the positive impacts yielded by FDI[9], believed to stem not only from the necessary capital FDI obviously provides to developing economies, but also through the positive direct and indirect spillover effects that are thought to derive from FDI. On the other side of the scale, some studies have also highlighted the negative effects originating from FDI[10]; especially that which is mostly extractive in nature[11], contributing to the history of resource-abundant countries being "cursed" with the tendency to grow slower than others[12].

This paper aims to contribute to the ongoing broad discussions regarding FDI by answering the following questions: (1) Does the economic prosperity of your neighbors affect your ability to attract FDI inflows; (2) Does the economic prosperity of your neighbors affect your economic growth in the long-run? (2) If yes, how so? Mongolia serves as a worthy case study to answer these questions due to the following reasonings: (a) It happens to be landlocked between two of the greatest economic and political powers in the world, China and Russia, making it interesting to see the dynamics a nation with two powerful neighbors is thrust into; (b) in a region flooded with autocratic rules, Mongolia is the only truly democratic country in the area; (c) it is the most sparsely populated country in the world, with half of its population residing in the capital city of Ulaanbaatar, and the other half dispersed throughout the vast countryside; (d) it is blessed with massive wealth in natural resources that may have the potential of USD 1.3 trillion in future earnings[13]; (e) due to its relatively small size, large investments in Mongolia have a multiplier effect on its economy, turning it into a land of almost limitless growth possibilities[14]; (f) its potential has been globally recognized,

9 Almfraji & Almsafir (2014).
10 Carkovic & Levine (2002); Durham (2004); Gцrg & Greenaway (2004); Hanson (2001).
11 Hirschman (1958); UNCTAD (2007).
12 See Sachs and Warner (1995).
13 Khashchuluun & Enkhjargal (2016).
14 Ibid.

leading it to being named a high actual and potential FDI recipient by the UNCTAD for more than a decade till 2013; and (g) relative to other countries, there has been a large gap in research concerning FDI in Mongolia, despite the FDI-led growth path ensued by the Mongolian authorities since its dual economic and political transition in the early 1990s. Our hope is that the findings presented in this paper will not only aid Mongolian policy makers in making more informed decisions, but that it will also serve as reference for other small, landlocked developing countries (LLDC).

The remainder of this paper will continue with a: (i) brief review of the background; (ii) description of the data and methodologies employed; (iii) reports of the empirical findings; (iv) discussion of the empirical findings and their policy implications; ending with a (v) conclusion.

2. Background

It would not be misleading to emphasize the complicated historical relationship between Mongolia, China, and Russia. In 1924, Mongolia evolved into a Soviet Satellite state, and remained one till the downfall of the Union of Soviet Socialist Republics (USSR). In 1978, China embarked on a path of economic liberalization; and in the early 1990s, with the collapse of the USSR came the abrupt and nearly synchronized economic transitions of Mongolia and Russia from a command-based economy to a more decentralized one based on capitalist ideals, free-market principles, and private property. Following a period of transitory turmoil, these economic reforms were successful in drastically improving the living standards of the citizens, especially in China where half a billion people were actively lifted out of poverty[15]. However, rapid economic growth have been accompanied by a series of internal social ailments characterized by rising income disparity, unequal access to

15 Schellekens (2013).

quality healthcare and education, and environmental degradation in all three countries. Moreover externally, the location of the three countries have rendered them - especially Mongolia - highly influenced by (if not dependent on) the economic situation of the other two.

In the past fifteen years, the emergence of the BRICs - an acronym coined by O'Neill in 2001, which nowadays have grown to become synonymous with the potential of global economic domination by the nations of Brazil, Russia, India, and China - have ushered in a new sense of hope for low-income countries (LIC), as BRICs is increasingly being viewed as a powerful source of economic stimulation for growth in developing countries in general[16]. Within the BRICs, China's contribution has been accentuated with Chinese FDI to LICs accounting for more than 90% of total BRICs FDI outflows to LICs from 2000 to 2007[17]. Therefore, China has been credited for playing a major role in transforming Asia into the world's largest economic system, where it serves as the nexus of intra-Asian trade and FDI[18]. However, the BRICs' influence have been seen to pose both advantages and risks to their neighboring countries. On the one hand, their growth was seen to supplement massive spillovers to LICs, especially those in Asia and Africa that are rich in natural resources. On the other hand, they have been simultaneously accused of crowding out their competitors, and exerting detrimental impression on the long-term growth of developing countries.

From the LICs, Mongolia exhibited one of the highest growths in gross domestic product (GDP), attracted the most FDI, and cultivated one of the greatest trade relations with BRICs within the seven year period from 2000 to 2007. However, as the direct landlocked neighbor of half of the BRICs, Mongolia has been largely affected by China and Russia's economic growth; and its dependence on their investment, trade, and

16 International Monetary Fund [IMF] (2011); O'Neill (2001); Wilson & Purushothaman (2006).
17 IMF (2011).
18 Morck & Yeung (2016).

donor assistance has been a cause of national concern[19]. These feelings of unease chiefly stem from the fact that in a progressively globalized world, the higher the competitive advantage of a nation, the lower the FDI is considered to be allocated to its neighboring countries[20], particularly if the neighboring country is a developing economy[21]. This theory is based on the spatial interdependence that all countries are thought to be subjected to[22] without discrimination, and it has been the primary reason for eliciting concern amongst the international community - including Mongolia - that Chinese economic growth and its impressive ability to attract FDI would divert FDI from other countries, and thereby stunt their developmental process. Yet this theory has also been criticized for not only being inadequately backed by empirical evidence, but also for being partially based on the assumption that global FDI is somewhat fixed[23].

Therefore, we are led to the question of whether it is China's growth, or its demise, that will help or hinder Mongolia's FDI inflows, and its economic growth into the sustainable future. Moreover, seeing as Mongolia is historically, economically, politically, as well as geographically intimately connected to Russia, the question of whether the international communities' perception of Russian prospects extends to Mongolia, perseveres. The latter is especially intriguing at a time where global prices of oil are falling, and the sanctions imposed by the international community caused by the annexation of Crimea has thrust Russia into structural, cyclical, and external crises[24], further increasing geopolitical tensions and causing a slow-down in its economic activity.

19 Campi (2005).
20 Ekholm et al. (2003).
21 When investigating the spatial interdependence of FDI flows, Blonigen et al. (2007) found a statistically significant negative correlation between the FDI allocation of a non-OECD country and the potential of the surrounding markets that seemingly grows in absolute magnitude.
22 Blonigen et al. (2007).
23 Ravenhill (2006).
24 Medvedev (2015).

In terms of studies conducted on FDI in Mongolia, most have been descriptive in nature[25]. The even fewer quantitative studies have not found evidence of FDI flows to Mongolia positively contributing to Mongolia's economic growth or to its social conditions[26]. In terms of FDI determinants, Davaakhuu et al. (2015) found market growth rate, infrastructure, and Chinese economic growth to positively contribute to - and geographical distance to negatively influence - FDI flows into Mongolia

3. Research Methodologies

3.1 Empirical model and data

The aim of the paper at hand is twofold: (1) Determine the relationship between FDI, sustained domestic economic growth, trade, and macroeconomic instability; and most importantly, (2) investigate the impact of China and Russia's economic growth on FDI inflows to Mongolia, and sustained Mongolian economic growth. In doing so, the following objectives were maintained: (a) analyze the presence of cointegrating, long-run equilibrium relationships between Mongolian FDI inflows, merchandise trade, exchange rate depreciation, domestic economic growth, and the economic growth of China and Russia; (b) determine the short-and long-run relationships between the aforementioned variables; and (c) establish the direction of Granger causality running between the variables studied.

Therefore, in accordance with the above-mentioned objectives - and based on availability of data - we found the following empirical models (*Eq. 1* and *Eq. 2*) to be of interest:

$$FDI = f(GDPgr, CHNgr, RUSgr, MER, EXR) \quad (1)$$

$$GDPgr = f(FDI, CHNgr, RUSgr, MER, EXR) \quad (2)$$

25 See Demirbag et al. (2005); Kaynak et al. (2007); Mungunzul & Chang (2016); and Nachin (2005).
26 Davaakhuu et al. (2014).

where FDI is real aggregate FDI inflows to Mongolia; GDP*gr*, CHN*gr*, and RUS*gr* are real GDP growth of Mongolia, China, and Russia, respectively, serving as proxies for sustained economic growth of the economies; MER is the real value of the sum of merchandise exports and imports over GDP, serving as a measure for trade openness; and EXR is the exchange rate from Mongolian Tugrug (MNT) to USD, serving as an indicator of macroeconomic instability.

Due to the well documented problems associated with heteroskedasticity, as well as for efficiency and consistency, all variables apart from EXR were either transformed into natural logarithm or calculated in percentages, using constant prices with the year 2005 serving as the base year (2005 = 100). Annual data from 1992 to 2014 were obtained from the World Bank[27], and the statistical packages of E-views 9 and R were used for econometric analysis.

3.2 Methodology specification

3.2.1 Unit roots and cointegration tests

Due to the common affliction of spurious regression results in time series analysis, we have initiated our study with the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to assess the stationarity of the variables included in the study. After confirming that none of the variables are integrated of order *I*(2), we proceeded to employ the autoregressive distributed lag (ARDL) bounds testing approach to cointegration, developed by Pesaran and Shin (1999) and Pesaran et al. (2001), to determine the existence of long-run equilibrium relationships between the variables of interest in the case of Mongolia by estimating the following unrestricted error-correction model (*Eq. 3*) using ordinary least squares, taking each variable as the dependent and independent variable in turns:

$$\Delta Y_t = a_0 + b_t T + \sum_{j=1}^{k} \theta_j \Delta Y_{t-j} + \sum_{j=0}^{k} \vartheta_j \Delta X_{t-j} + \eta_1 Y_{t-1} + \eta_2 X_{t-1} + e_t \qquad (3)$$

27 Retrieved from http://databank.worldbank.org

where Δ is the first-difference operator, a_0 is the intercept, T is the time trend, t is the time period, k is the lag length, j is the lag order, Y_t is the dependent variable, X_t is a vector of k determinants of Y_t, e_t is white noise, θ_j and ϑ_j are the short-run dynamics, and η's are the long-run multipliers.

The null hypothesis of no-cointegration between the variables, $H_0: \eta_1 = \eta_2 = 0$, is tested against the alternative hypothesis, $H_1: \eta_1 \neq \eta_2 \neq 0$, via an F-test. The small sample critical values generated by Narayan (2005) were employed, with the null hypothesis rejected if the F-statistics exceed the upper bounds of the $I(1)$ critical values. However, should the F-statistics fall below the lower bounds of the $I(0)$ critical values, we fail to reject the null-hypothesis; and if the F-statistics lie in between the $I(0)$ and $I(1)$ critical values, the results are deemed inconclusive.

The appeal of the ARDL bounds test, and the reasons for it being our methodology of choice, resides in its: (i) Superior performance in studies with small finite samples; (ii) application in models consisting of variables that are stationary at $I(0)$, $I(1)$, or a mixture of both; (iii) flexibility in allowing uneven lag orders of the variables; and (iv) integration of the short-run dynamics alongside the long-run equilibrium, resulting in the preservation of long-run information.

3.2.2 Long- and short-run relationships

Should the ARDL bounds tests support stable long-run relationships amongst the variables, the following conditional ARDL long-run models (*Eq. 4* and *Eq. 5*) are estimated using Fully Modified Ordinary Least Squares (FMOLS):

$$\mathrm{FDI}_t = \theta_0 + \theta_1 \mathrm{T} + \sum_{i=1}^{a} \theta_{2FDIi}\, \mathrm{FDI}_{t-i} + \sum_{j=0}^{b} \theta_{3GDPgrj}\, \mathrm{GDP}gr_{t-j} + \sum_{j=0}^{c} \theta_{4CHNgrj}\, \mathrm{CHN}gr_{t-j} + \sum_{j=0}^{d} \theta_{5RUSgrj}\, \mathrm{RUS}gr_{t-j} + \sum_{j=0}^{e} \theta_{6MERj}\, \mathrm{MER}_{t-j} + \sum_{j=0}^{e} \theta_{7EXRj}\, \mathrm{EXR}_{t-j} \epsilon_t \quad (4)$$

$$\mathrm{GDP}gr_t = \theta_0 + \theta_1 \mathrm{T} + \sum_{i=1}^{a} \theta_{2GDPgri}\, \mathrm{GDP}gr_{t-i} + \sum_{j=0}^{b} \theta_{3FDIj}\, \mathrm{FDI}_{t-j} + \sum_{j=0}^{c} \theta_{4CHNgrj}\, \mathrm{CHN}gr_{t-j}$$

$$+ \sum_{j=0}^{d} \theta_{5RUSgrj}\, \mathrm{RUS}gr_{t-j} + \sum_{j=0}^{e} \theta_{6MERj}\, \mathrm{MER}_{t-j} + \sum_{j=0}^{e} \theta_{7EXRj}\, \mathrm{EXR}_{t-j}\, u_t \qquad (5)$$

where θ_0 are the drift components in the equations, and $\overline{\mathbf{ar}}$ represent the error terms that are assumed to be independent and identically distributed. The FMOLS estimator was chosen - like the ARDL bounds test - also due to its reported greater performance in small finite samples, and models with mixed *I*(0), *I*(1) regressors and unit roots. After the estimation of the long-run equations - and the consequent attainment of the long-run coefficients - the following short-run error-correction models (*Eq. 6* and *Eq. 7*) were estimated:

$$\begin{aligned}\Delta\mathrm{FDI}_t = {} & \varphi_0 + \sum_{i=1}^{a} \varphi_{1FDIi}\, \Delta\mathrm{FDI}_{t-i} + \sum_{j=0}^{b} \varphi_{2GDPgrj}\, \Delta\mathrm{GDP}gr_{t-j} + \sum_{j=0}^{c} \varphi_{3CHNgrj}\, \Delta\mathrm{CHN}gr_{t-j} \\ & + \sum_{j=0}^{d} \varphi_{4RUSgrj}\, \Delta\mathrm{RUS}gr_{t-j} + \sum_{j=0}^{e} \varphi_{5MERj}\, \Delta\mathrm{MER}_{t-j} \\ & + \sum_{j=0}^{e} \varphi_{6EXRj}\, \Delta\mathrm{EXR}_{t-j} + \mathrm{ECM}_{t-1} + \square_t \end{aligned} \qquad (6)$$

$$\begin{aligned}\Delta\mathrm{GDP}gr_t = {} & \varphi_0 + \sum_{i=1}^{a} \varphi_{1GDPgri}\, \Delta\mathrm{GDP}gr_{t-i} + \sum_{j=0}^{b} \varphi_{2FDIj}\, \Delta\mathrm{FDI}_{t-j} + \sum_{j=0}^{c} \varphi_{3CHNgrj}\, \Delta\mathrm{CHN}gr_{t-j} \\ & + \sum_{j=0}^{d} \varphi_{4RUSgrj}\, \Delta\mathrm{RUS}gr_{t-j} + \sum_{j=0}^{e} \varphi_{5MERj}\, \Delta\mathrm{MER}_{t-j} \\ & + \sum_{j=0}^{e} \varphi_{6EXRj}\, \Delta\mathrm{EXR}_{t-j} + \mathrm{ECM}_{t-1} + \square_t \end{aligned} \qquad (7)$$

where φ_0 are the drift components in the equations; ECM_{t-1} are the error correction terms attained from the long-run associations, whose significance indicates the disposition of the variables to return to their long-run equilibrium relationships; and $\square_t$ represent the error terms that are assumed to be independent and identically distributed.

3.2.3 Granger causality

In the event that cointegration is established amongst the variables under study, we proceed to the final step of discerning the existence of short- and long-run Granger causal relations via a vector error correction model (VECM) framework. Contrariwise, if a cointegrating relationship is not found amongst the variables, a first-difference form of a vector autoregressive model may also be employed to test for the presence of short-run Granger causality. Should cointegration be found, the

following VECM is estimated (*Eq. 8*):

$$\Delta\begin{bmatrix}\text{FDI}\\ \text{GDP}gr\\ \text{CHN}gr\\ \text{RUS}gr\\ \text{MER}\\ \text{EXR}\end{bmatrix}_t = \begin{bmatrix}\sigma_1\\ \sigma_2\\ \sigma_3\\ \sigma_4\\ \sigma_5\\ \sigma_6\end{bmatrix} + \sum_{s=0}^{k}\begin{bmatrix} w_{11} & w_{12} & w_{13} & w_{14} & w_{15} & w_{16}\\ w_{21} & w_{22} & w_{23} & w_{24} & w_{25} & w_{26}\\ w_{31} & w_{32} & w_{33} & w_{34} & w_{35} & w_{36}\\ w_{41} & w_{42} & w_{43} & w_{44} & w_{45} & w_{46}\\ w_{51} & w_{52} & w_{53} & w_{54} & w_{55} & w_{56}\\ w_{61} & w_{62} & w_{63} & w_{64} & w_{65} & w_{66}\end{bmatrix}_s \times \Delta\begin{bmatrix}\text{FDI}\\ \text{GDP}gr\\ \text{CHN}gr\\ \text{RUS}gr\\ \text{MER}\\ \text{EXR}\end{bmatrix}_{t-s} + \begin{bmatrix}\pi_1\\ \pi_2\\ \pi_3\\ \pi_4\\ \pi_5\\ \pi_6\end{bmatrix} \times ECM_{t-1} + \begin{bmatrix}\epsilon_1\\ \epsilon_2\\ \epsilon_3\\ \epsilon_4\\ \epsilon_5\\ \epsilon_6\end{bmatrix}_t$$

where σ_j (i = 1, … , n) represent the intercepts of the models; ECM_{t-1} is the one period lagged error-correction term, whose significance indicates the presence of long-run causality; and the ϵ_{it} are serially uncorrelated random disturbance terms with zero mean. A significant joint F-test on the lagged explanatory variables is indicative of short-run causality; with the null hypothesis of no short-run causality, $H_o: \omega_{ij=0}$, tested against the alternative hypothesis, $H_1: \omega_{ij=0}$.

4. Empirical Findings

In this section, the results of the econometric tests described in section 3 are reported. To start off, the Jarque-Bera test confirmed all variables - namely FDI_t, $\text{GDP}gr_t$, $\text{CHN}gr_t$, $\text{RUS}gr_t$, MER_t, and EXR_t - to be normally distributed. Moreover, the correlation matrix demonstrated the strong correlation between FDI_t , $\text{GDP}gr_t$, and EXR_t.

4.1 Unit root and cointegration tests

From *Table 1*, we can see that both the ADF and PP tests show $\text{GDP}gr_t$, $\text{RUS}gr_t$, and MER_t to be stationary at level. However at first difference, both tests indicate all variables to be stationary. Therefore on the basis of the 2 unit root tests, we can conclude that $\text{GDP}gr_t$, $\text{RUS}gr_t$, and MER_t are *I*(0); while FDI_t, $\text{CHN}gr_t$, and EXR_t are *I*(1). As the variables are found to be mutually integrated of orders *I*(0) and *I*(1), the bounds testing approach to cointegration is considered a suitable methodology for this study.

Table 1

ADF and PP unit root test results.

Variables	ADF						PP					
	I (0)			*I* (1)			*I* (0)			*I* (1)		
	No C or T	C	C+T	No C or T	C	C+T	No C or T	C	C+T	No C or T	C	C+T
FDI	1.19 (0)	-2.51 (0)	-3.26 (3)	-4.61 (0) ***	-4.49 (0) ***	-4.69 (0) ***	1.18 (0)	-2.51 (0)	-2.70 (1)	-4.58 (1) ***	-4.49 (0) ***	-4.69 (0) ***
GDP*gr*	-1.51 (0)	-3.33 (0) **	-4.61 (1) ***	-4.77 (1) ***	-4.73 (1) ***	-4.67 (1) ***	-1.53 (2)	-3.42 (5) **	-5.44 (12) ***	-5.52 (20) ***	-7.04 (20) ***	-8.68 (20) ***
CHN*gr*	-0.54 (0)	-1.92 (0)	-2.20 (0)	-5.32 (0) ***	-5.34 (0) ***	-5.07 (0) ***	-0.53 (2)	-1.92 (0)	-2.39 (1)	-5.32 (2) ***	-5.39 (3) ***	-5.07 (4) ***
RUS*gr*	-2.77 (0) ***	-2.95 (0) *	-2.64 (0)	-6.68 (0) ***	-6.60 (0) ***	-4.59 (2) ***	-2.74 (1) ***	-2.97 (4) **	-2.51 (2)	-7.01 (6) ***	-6.93 (8) ***	-16.97 (17) ***
MER	0.36 (0)	-3.81 (0) ***	-4.27 (0) ***	-5.61 (1) ***	-5.58 (1) ***	-5.69 (1) ***	1.14 (14)	-3.83 (1) ***	-4.28 (2) ***	-10.99 (7) ***	-10.69 (7) ***	-9.86 (7) ***
EXR	2.36 (0)	-1.55 (0)	-2.56 (0)	-2.72 (0) ***	-3.67 (0) ***	-3.29 (0) *	2.11 (1)	-1.55 (2)	-2.59 (1)	-2.72 (0) ***	-3.67 (1) ***	-3.29 (1) *

Notes:

* Denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; *** denotes significance at the 1 percent level.

( ) Denotes the optimal lag order or bandwidth for the ADF and PP unit root tests, respectively. The optimal lag order for the ADF test is selected using the Schwarz information criterion (SIC). The optimal bandwidth for the PP test is selected using the Bartlett Kernel Newey–West method.

C Denotes the constant term; T denotes the trend term.

Table 2

Results from the bounds testing approach to cointegration.

Results from the bounds testing approach to cointegration.

No.	Model	ARDL	F-stat	Nar (p)	Conclusion
1 a	*F* (FDI| GDP*gr* , CHN*gr* , RUS*gr* , MER, EXR)	(1,0,1,1,0,1)	6.548	***	Cointegrated
b	*F* (GDP*gr* | FDI, CHN*gr* , RUS*gr* , MER, EXR)	(1,2,2,1,0,0)	18.329	***	Cointegrated
c	*F* (CHN*gr* | FDI, GDP*gr* , RUS*gr* , MER, EXR)	(1,1,1,1,1,1)	13.270	***	Cointegrated
d	*F* (RUS*gr* | FDI, GDP*gr* , CHN*gr* , MER, EXR)	(1,0,1,1,1,1)	3.293		Not-cointegrated
e	*F* (MER| FDI, GDP*gr* , CHN*gr* , RUS*gr* , EXR)	(1,0,0,1,0,1)	3.596		Not-cointegrated
f	F(EXR| FDI, GDPgr, CHNgr, RUS*gr* , MER)	(1,0,0,1,0,0)	5.969	**	Cointegrated
Lower bound critical value for *k* =5		2.907 *	3.504 **		4.850 ***
Upper bound critical value for *k* =5		4.010 *	4.743 **		6.473 ***

Notes:

ARDL Denotes the selected ARDL model based on the SIC.

Nar (p) Denotes the level of statistical significance based on critical values obtained from Narayan (2005) for case IV of unrestricted intercept and restricted trend.

* Denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; *** denotes significance at the 1 percent level.

Since the bounds testing approach to cointegration is sensitive to the ARDL model's choice of lag order, we set the maximum lag order to 3 years, with the optimal ARDL model selected based on the Schwarz Information Criterion (SIC) for consistent estimators. From the results of the bounds testing approach to cointegration reported in *Table 2*, we can see that the null hypothesis of no cointegration is rejected at the 5% significance level, or better, for all except for models $F_{\text{RUS}gr}$(RUS*gr* | FDI, GDP*gr*, CHN*gr*, MER, EXR) and F_{MER}(MER | FDI, GDP*gr*, CHN*gr*, RUS*gr*, EXR); thereby confirming the meaningful long-run equilibrium relationships shared by the variables.

Table 3 displays the results of the Breusch-Godfrey, Breusch-Pagan-Godfrey, ARCH LM, and Ramsey RESET tests conducted on the two main models of interest - F_{FDI}(FDI | GDP*gr*, CHN*gr*, RUS*gr*, MER, EXR) and $F_{\text{GDP}gr}$(GDP*gr* | FDI, CHN*gr*, RUS*gr*, MER, EXR) - from which we can conclude that the models are free from serious issues concerning serial correlation, heteroskedasticity, and model misspecification. This, in combination with the high R-squared statistics of the models that suggest 77% and 93% of the variance in FDI and GDP*gr* can be explained by the variables we have identified, serve as further evidence of the suitability of the selected ARDL models, and the high reliability and consistency of the cointegration estimates.

Table 3

Results of the diagnostic tests conducted on the models of interest.

Model	ARDL	F-stat	Breusch-Godfrey	Breusch-Pagan-Godfrey	ARCH LM
F(FDI| GDP*gr* , CHN*gr* , RUS*gr* , MER, EXR)	(1,0,1,1,0,1)	6.548 ***	0.632 (0.427)	12.712 (0.240)	[1] 2.276 (0.131) [2] 2.421 (0.298)
			Ramsey RESET	R-squared	Adj.R-squared
			[1] 0.346 (0.570) [2] 1.258 (0.330)	0.881	0.772
Model	ARDL	F-stat	Breusch-Godfrey	Breusch-Pagan-Godfrey	ARCH LM
(GDP*gr* | FDI, CHN*gr* , RUS*gr* , MER, EXR)	(1,2,2,1,0,0)	18.329 ***	0.002 (0.969)	17.161 (0.144)	[1] 1.343 (0.247) [2] 2.466 (0.292)
			Ramsey RESET	R-squared	Adj.R-squared
			[1] 1.548 (0.254) [2] 0.834 (0.479)	0.973	0.933

Notes:
The SIC statistic was used to select the optimal lag order.
* Denotes significance at the 10 percent level. ** denotes significance at the 5 percent level. *** denotes significance at the 1 percent level.
( ) Refers to the p-values associated with the test; [ ] refers to the dignostics test order.

4.2 Long-run and short-run relationship analyses

Since we have successfully established the existence of cointegrating relationships, we can conclude that in the case of Mongolia FDI, GDP*gr*, and the variables of interest are moving together in the long-run. This leads us to our next step of quantifying the long-run relationships shared between the variables using the FMOLS. Results obtained from the OLS estimation is also provided for comparative purposes. The results of the FDI long-run equation are reported in *Table 4*, from which we can see that the coefficient estimates of the independent variables - and

their subsequent presence or lack of significance - do not differ critically between the FMOLS and OLS estimation methods. The results indicate that on the one hand FDI flows into Mongolia respond positively to increases in GDP*gr*, RUSgr, and MER. On the other hand, it responds negatively to increases in CHN*gr* and EXR. More explicitly, the FMOLS estimation results suggest that a 1% increase in domestic and Russian GDP growth would translate into a 0.03% and 0.04% increase in FDI, respectively; while a 1% increase in merchandise trade would result in a 1.8% increase in FDI. Conversely, a 1-unit depreciation of the exchange rate, and a 1% increase in China's economic growth would reduce FDI inflows by 0.003% and 0.09%, respectively in the long-run. The findings stress the importance of merchandise trade in influencing FDI inflows to Mongolia, as the magnitude of MER's coefficients imply the most economic significance. Although at first glance the impact of exchange rate is not evident, the 91.55 unit appreciation and 92.06 unit depreciation of the MNT relative to the USD in 2011 and 2012, respectively, would result in a 0.30% increase and 0.30% decrease in FDI inflows, respectively, according to the FMOLS results. Moreover, the results also highlight a surprising discovery regarding the higher impact the economic growth of Mongolia's neighbors seem to exert on inward FDI to Mongolia in relation to its own domestic economic growth.

Table 4

Long- and short-run equation results for FDI model.

Long- and short-run equation results for FDI model.

Variables	Long-run equation - FMOLS					Variables	Long-run equation - OLS				
	Coefficients	Std. Error	t-Statistics				Coefficients	Std. Error	t-Statistics		
Constant	9.957139	0.934233	10.65809 (0.0000) ***			Constant	10.106970	2.004765	5.041474 (0.0015) ***		
Trend	0.379702	0.019272	19.70236 (0.0000) ***			Trend	0.376610	0.040663	9.261677 (0.0000) ***		
GDP*gr*	0.033540	0.009462	3.544750 (0.0121) **			GDP*gr*	0.034263	0.018426	1.859541 (0.1053)		
CHN*gr*	-0.085874	0.020650	- 4.158468 (0.0060) ***			CHN*gr*	-0.082017	0.043010	- 1.906927 (0.0982) *		
RUS*gr*	0.044741	0.006939	6.447399 (0.0007) ***			RUS*gr*	0.043245	0.009619	4.495718 (0.0028) ***		
MER	1.843779	0.204256	9.026797 (0.0001) ***	R-squared	0.993310	MER	1.786928	0.435878	4.099606 (0.0046) ***	R-squared	0.994442
EXR	-0.003299	0.000375	- 8.793254 (0.0001) ***	Adjusted R-squared	0.978816	EXR	-0.003209	0.000799	- 4.018532 (0.0051) ***	Adjusted R-squared	0.984119

Short-run equation

Variables	Coefficients	Std. Error	t-Statistics			Diagnostic tests			
Constant	0.805376	0.113881	7.072114 (0.0000) ***						
ΔGDP*gr*	0.068601	0.026195	2.618860 (0.0224) **	ECM(t-1) t-statistic	-5.425018 (0.0002) ***	Breusch-Godfrey LM	1.857804 (0.1729)		
ΔCHN*gr*	-0.514790	0.077136	- 6.673803 (0.0000) ***	R-squared	0.908507	Breusch-Pagan-Godfrey	4.584255 (0.8009)		
ΔRUS*gr*	0.060189	0.013031	4.618925 (0.0006) ***	Adj. R-squared	0.847512	ARCH	0.164891 (0.6847)		
ΔMER	1.972841	0.436638	4.518250 (0.0007) ***	F-statistic	14.89469 (0.0000) ***	Ramsey RESET	0.338748 (0.5723)		
ΔEXR	-0.006927	0.000808	- 8.570499 (0.0000) ***						

Notes:

( ) Refers to the p-values; * denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; *** denotes significance at the 1 percent level.

ECM(t-1) = FDI – (9.957139 + 0.379702*T + 0.03354*GDP*gr* - 0.085874*CHN*gr* + 0.044741*RUS*gr* + 1.843779*MER - 0.003299*EXR)

The results of the FDI short-run equation (*Table 4*) present us with essentially the same picture, with all the variables exhibiting the same signs as the long-run associations. According to the short-run model, FDI would increase by 0.07%, 0.06%, and 1.97% following a 1% increase in domestic and Russian economic growth, and merchandise trade; and decrease by 0.51% and 0.007% with a 1% increase in China's economic growth, and a 1-unit depreciation in the exchange rate. The results showcase the larger short-term effects - in relation to the long-term effects - of GDP*gr*, RUS*gr*, EXR, and CHN*gr* on Mongolian FDI inflows with almost double the impact; except for CHN*gr*, whose short-term impact is six-times that of its long-term impact. The influence of MER on FDI is more or less the same in the short- and long-run. Moreover, the significant negative sign of the one period lagged error-correction term [ECM(t-1)] implies that any short-run disequilibrium will be corrected and adjusted towards the long-run equilibrium.

Table 5

Long- and short-run equation results for GDPgr model.

Long- and short-run equation results for GDP*gr* model.

Variables	Long-run equation - FMOLS					Variables	Long-run equation - OLS				
	Coefficients	Std. Error	t-Statistics				Coefficients	Std. Error	t-Statistics		
Constant	-114.53750	60.01544	-1.908468 (0.1146)			Constant	-113.21070	65.71798	-1.722674 (0.1357)		
Trend	-4.44932	2.27537	-1.955426 (0.1079)			Trend	-4.29376	2.30235	-1.864943 (0.1115)		
FDI	14.30833	5.35052	2.674193 (0.0441) **			FDI	13.95521	5.29151	2.637284 (0.0387) **		
CHN*gr*	-0.28354	0.50923	-0.556795 (0.6017)			CHN*gr*	-0.28079	0.60521	-0.463951 (0.6590)		
RUS*gr*	-0.88967	0.32677	-2.722637 (0.0416) **			RUS*gr*	-0.82112	0.43056	-1.907092 (0.1051)		
MER	-25.91512	10.33448	-2.507635 (0.0540) *	R-squared	0.974442	MER	-24.78810	11.10609	-2.231939 (0.0671) *	R-squared	0.977024
EXR	0.02910	0.02093	1.390135 (0.2232)	Adjusted R-squared	0.902878	EXR	0.02738	0.02253	1.215217 (0.2699)	Adjusted R-squared	0.923413

Variables	Short-run equation							
	Coefficients	Std. Error	t-Statistics	Diagnostic tests				
Constant	-2.966401	0.568436	- 5.218531 (0.0004) ***					
ΔFDI	2.072381	0.769420	2.693433 (0.0226) **	ECM(t-1) t-statistic	-13.81937 (0.0000) ***		Breusch-Godfrey LM	0.845847 (0.3577)
ΔCHN*gr*	1.595069	0.361825	4.408405 (0.0013) ***	R-squared	0.982963		Breusch-Pagan-Godfrey	14.29816 (0.1598)
ΔRUS*gr*	-0.190507	0.071668	- 2.658199 (0.0240) **	Adj. R-squared	0.965927		ARCH	0.459271 (0.4980)
ΔMER	4.695103	3.036577	1.546183 (0.1531)	F-statistic	57.69735 (0.0000) ***		Ramsey RESET	1.333056 (0.2780)
ΔEXR	-0.000614	0.005362	- 0.114510 (0.9111)					

Notes:
( ) Refers to the p-values; * denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; *** denotes significance at the 1 percent level.
ECM(t-1) = GDP*gr* − (-114.5375 - 4.449324*T + 14.30833*FDI - 0.283536*CHN*gr* - 0.889674*RUS*gr* - 25.91512*MER + 0.029101*EXR)

Table 5 reports the GDP*gr* model's long- and short-run equation results, from which we are confronted with the positive impact of FDI on GDP*gr*, and the negative effect of RUS*gr* on GDP*gr*, in both the short- and long-run; with the long-run effects exceeding the short-run effects in magnitude. More precisely, the results indicate a 2.07% and 14.31% increases in GDP*gr* following a 1% increase in FDI inflows

in the short- and long-run, respectively. Whereas GDP*gr* is found to decrease by 0.19% and 0.89% in the event of a 1% increase in RUS*gr* in the short- and long-run, respectively. Furthermore, contrary to the results obtained from the FDI model, CHN*gr* has a positive short-term influence on GDP*gr,* which then turns insignificant in the long-run. Additionally according to *Table 5*, a 1% increase in MER would result in a substantial 25.92% decline in GDP*gr* in the long-run. Diverging from our expectations, EXR was not found to yield significant short- or long-term effects on GDP*gr*.

4.3 Granger causality analysis

As the presence of cointegrating relationships between FDI, GDP*gr*, and their determinants have been found; we now come to the final step of analyzing the existence and direction of Granger causality between the variables.

Table 6

Granger causality results based on the VECM framework.

Granger causality results based on the VECM framework.

Variables	Models					
	ΔFDI	Δ*GDPgr*	Δ*CHNgr*	Δ*RUSgr*	ΔMER	ΔEXR
∑ΔFDI(t-i)	---	25.83898 (0.0003) ***	36.42216 (0.0001) ***	3.547419 (0.2277)	4.021742 (0.0565) *	30.36349 (0.0002) ***
∑Δ*GDPgr* (t-i)	13.09587 (0.0030) ***	---	4.416895 (0.0510) **	4.807146 (0.1770)	0.485661 (0.6305)	1.370311 (0.3078)
∑Δ*CHNgr* (t-i)	65.40709 (0.0000) ***	115.1232 (0.0000) ***	---	4.339836 (0.1929)	3.229202 (0.0877) *	17.37174 (0.0012) ***
∑Δ*RUSgr* (t-i)	38.06842 (0.0001) ***	26.78195 (0.0003) ***	20.62200 (0.0007) ***	---	3.791962 (0.0639) *	7.736811 (0.0135) ***
∑ΔMER(t-i)	12.70344 (0.0033) ***	1.293940 (0.3259)	12.14107 (0.0038) ***	2.629469 (0.2875)	---	9.067384 (0.0088) ***
∑ΔEXR(t-i)	90.86064 (0.0000) ***	3.620479 (0.0759) *	58.62367 (0.0000) ***	2.040197 (0.3457)	7.923108 (0.0104) ***	---
ECM(t-1) t-statistic	-7.127593 (0.0001) ***	-15.19579 (0.0000) ***	-5.640563 (0.0005) ***	---	---	-3.766664 (0.0055) ***
Direction of causality	*GDPgr* --> FDI *CHNgr* --> FDI *RUSgr* --> FDI MER --> FDI EXR --> FDI	FDI --> *GDPgr* *CHNgr* --> *GDPgr* *RUSgr* --> *GDPgr* EXR --> *GDPgr*	FDI --> *CHNgr* *GDPgr* --> *CHNgr* *RUSgr* --> *CHNgr* MER --> *CHNgr* EXR --> *CHNgr*		FDI --> MER *CHNgr* --> MER *RUSgr* --> MER EXR --> MER	FDI --> EXR *CHNgr* --> EXR *RUSgr* --> EXR MER --> EXR

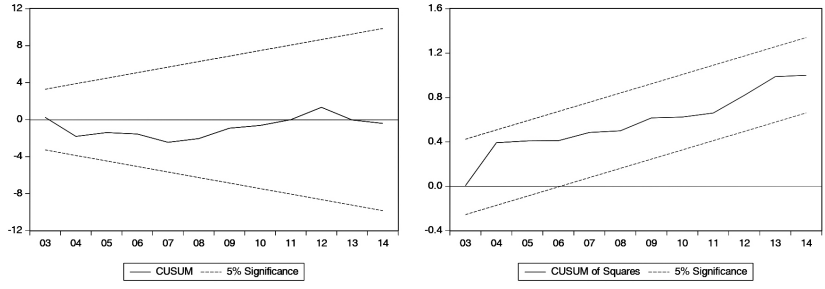
Notes:
( ) Refers to the p-values; * denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; *** denotes significance at the 1 percent level.
The SIC statistic was used to select the optimal lag order.

The results of the VECM (*Table 6*) demonstrate the significant negative sign of the one period lagged error-correction terms [ECM(t-1)] in all the models studied, apart from models Δ*RUSgr* and ΔMER, at the 1% level of significance. This supports our previous results from the bounds test that imply the long-run bidirectional causality between FDI and GDP*gr*, CHN*gr*, and EXR; and long-run unidirectional Granger causality running from RUS*gr* and MER to FDI and GDP*gr*.

Additionally, short-run bidirectional Granger causality is found between FDI and GDP*gr*, CHN*gr*, and EXR; and between GDP*gr* and CHN*gr*. Short-run unidirectional Granger causality is also witnessed running from RUS*gr* to FDI and GDP*gr*; and from MER to FDI.

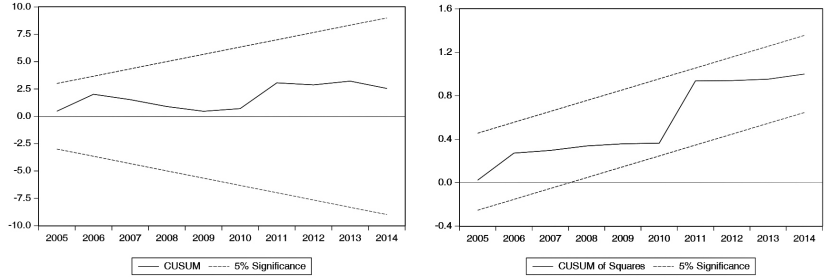
Finally, *Fig. 1* and *2* display the plots of cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMQ) tests of the FDI_t and $GDPgr_t$ models. As all the residuals are found to be contained within the critical bounds of the 5% significance level, the CUSUM and the CUSUMQ serve as further proof of the stability and reliability of the long-run cointegration estimates.

Fig. 1. FDI | GDP*gr*, CHN*gr*, RUS*gr*, MER, EXR model CUSUM and CUSUMQ.



Source: The Output of CUSUM and CUSUMQ were retrieved from Eviews 9 econometric software.

Fig. 2. GDP*gr* | FDI, CHN*gr*, RUS*gr*, MER, EXR model CUSUM and CUSUMQ.



Source: The Output of CUSUM and CUSUMQ were retrieved from Eviews 9 econometric software.

5. Discussion and policy implications

The chief intention of this study was to support Mongolian policy makers in making more informed decisions when drafting policies pertaining to FDI attraction and sustained economic growth stimulation. The novelty of this study regarding its contribution to the existing literature resides in the: (1) Inclusion of merchandise trade as a measure of trade openness in Mongolia, whereas previous studies have used different variables; and (2) econometric analysis of the impact of spatial interdependence on Mongolia's FDI inflows and sustained economic growth. It is important to stress that this study is not comprehensive, as there are many ways in which China and Russia's growth may affect Mongolia. Therefore, the study at hand is meant to provide a mere starting point in quantitatively assessing the spillovers from Chinese and Russian economic growth to Mongolian FDI inflows and economic growth.

Let us commence our discussion with our findings pertaining to merchandise trade and exchange rate depreciation on Mongolian FDI

inflows and sustained economic growth. The significantly negative short- and long-run impacts of exchange rate depreciation on FDI inflows, and the short- and long-run bidirectional causality running between the two, highlight the harmful effects of macroeconomic instability on investor confidence, and support the continuation of the reforms undertaken by the Democratic Coalition during the early years of the transition that aimed for macroeconomic stabilization. Moreover, since FDI in Mongolia is primarily directed towards the mining sector, the results emphasize the sensitivity of FDI flows geared towards the primary sector - which has relatively higher sunk-costs - to market instability. Therefore, the negative impact of exchange rate depreciation on FDI is found to be relatively robust as it corroborates the unpublished findings of Och et al. (2015). Merchandise trade, as a measure of trade openness, was found to complement FDI inflows, yet discourage sustained economic growth, causing a 25.92% decrease in economic growth in the long-run. This finding is interesting as it fuels the debate on the costs of attracting FDI on economic growth. On the one hand, lower trade barriers contribute to higher FDI flows. Yet on the other hand, Mongolia has been suffering from a decline in its terms of trade, which is proving to be detrimental to its economic growth in the long-run.

FDI and sustained economic growth were found to exert positive effects on one another in both the short- and long-run, each Granger causing the other. However, FDI was found to contribute more to GDP*gr* in both the short- and long-run, compared to the impact of GDP*gr* on FDI. The unpublished findings of Och et al. (2015) had demonstrated an inverted U-shaped relationship between FDI and GDP. The findings of this study further contribute to those results by expanding on the relationship between FDI and GDP growth in Mongolia to have an 'N' shape, where increases in FDI leads to an initial increase in GDP, which then declines, only to pick up again in the form of *sustained* economic growth. This 'N'-shaped relationship is in support of the long-term investments made

by Mongolian authorities - such as massive infrastructure development - with the revenues garnered from FDI inflows, whose returns are realized in the long-run.

Finally we come to the main question of our study: whether the sustained economic growth of China and Russia influence Mongolia's inward FDI and sustained economic growth, and the manner in which they do so. China's economic growth was found to have a short- and long-run negative impact on FDI inflows into Mongolia, which is in corroboration with the findings of Eichengreen and Tong (2007) for OECD countries. This showcases the importance of China's economic growth in investors' locational decision-making process. When faced with the decision to invest in a China with strong economic growth prospects that are seen to be sustainable, FDI that may have otherwise been directed to a new emerging market - such as Mongolia - is diverted to China. Moreover, seeing as China is Mongolia's largest foreign investor, the results imply that sustained Chinese economic growth may also spur domestic investment in China at the expense of Chinese FDI outflows. On the other hand, China's economic growth is also seen to exert a significantly positive impact on GDP*gr* in the short-run, which then turns insignificant in the long-run. This is indicative of the short-run positive effects of increases in Chinese imports, exports, and FDI on Mongolian GDP that accompany Chinese GDP growth; and is in line with the conclusion reached by Qiu and Zhan (2006), who claimed that the overall influence of China's economic success on other Asian economies is positive, but quantitatively small. Surprisingly, Russian economic growth was found to have a significantly positive short- and long-run impact on FDI; and a negative short- and long-run effect on GDP*gr*. This reflects the relative importance of global oil prices on FDI flows to Mongolia, and the reliance of the mining sector on fuel consumption. Whereas on the other hand, rising oil prices would negatively impact sustained Mongolian economic growth through declines in Mongolia's

terms of trade. Moreover, the bidirectional Granger causality found running between CHN*gr*, FDI, and GDP*gr* - and the unidirectional causality found running from RUS*gr* to FDI and GDP*gr* - support the spatial interdependence advocated by Blonigen et al. (2007) and Ekholm et al. (2003) between Mongolia, China, and Russia pertaining to inward FDI and sustained economic growth in Mongolia.

In terms of policy recommendations, our findings suggest that in order to increase FDI inflows, and most importantly reap the multitude of growth-enhancing benefits that accompany it, Mongolian authorities should: (1) Prioritize a steady and sustainable economic growth path by reinforcing domestic productive capacity; (2) monitor, and push for policies that aim for, exchange rate stabilization; (3) diversify its economy away from commodities, so as to limit its vulnerability to external shocks; and (4) actively pursue further global integration so as to reduce dependency on its two neighbors. Unfortunately, the recommendations outlined above, although comparatively straight forward, do not have shortcuts. In order to increase domestic productive capacity: (a) Investments in human capital development should be highlighted as it will aid Mongolia in moving up the value-added curve; (b) infrastructure must be further developed; (c) a friendly investment climate should be pursued; (d) domestic access to capital must be enhanced through development of the financial sector; and (e) investment efficiency should be increased through transparency of bidding processes and filtering of projects that are expected to yield high returns. Likewise, the attraction of FDI into the non-extractive sectors is especially sensitive to the host economy's institutional qualities.

As for future research, with the availability of data with time, the determination and quantification of the various different channels of spillovers from China and Russia in more detail would be merited.

CONCLUSION

We examined and found the presence of interspatial dependence between Mongolia, China, and Russia regarding sustained economic growth and FDI inflows to Mongolia. Due to the relatively small size of our sample, this study is meant to be a first step in quantifying the spillover effects of China and Russia's economic growth on Mongolia. Our findings suggest that Mongolian authorities should cautiously monitor depreciations in its exchange rate; and reduce its dependency on its two neighbors by increasing domestic productive capacity, diversifying its economy away from commodities, and pursuing further integration into the global markets. Although Mongolia is used as a case study, the findings presented in this paper can be generalized and it reiterates the notion that small, open LLDCs are especially sensitive to the economic conditions of its neighbors.

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