

Financial development and FDI inflows in China

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Abstract

In this paper, the authors revisit the nexus of financial development and FDI inflows in Chinese perspective, incorporating the vital role of institutional quality and other important variables in this paradigm. Using ARDL bound testing and VECM procedures, they establish causality by exploiting variations in financial development and FDI. To unmask the shortcomings in the previous literature, the authors use a composite index of financial development, recently developed by the IMF, since it provides a more fine-grained analysis. The results show that there is a long-run relationship between FDI and financial development. Bidirectional causality is confirmed by using VECM. The inclusion of control variables, e.g., institutional quality, transport infrastructure, per capita GDP, trade openness, domestic investment, natural resources rent, is robust in the analysis. The positive role of financial development in FDI inflows is of utmost importance for policymakers and the Chinese government. Several policy implications are given in this study.

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1. Introduction

China's financial development is a crucial phenomenon the world witnessed. China introduced many reforms in its financial system to facilitate businesses. Its four state-owned banks, the big four, are amongst the world's largest financial institutions in 2018.¹ The massive FDI (foreign direct investment) inflows in China are a marvelous phenomenon the world sees during the last three decades. The opening-up policy made China the 4th largest destination for foreign investments with total FDI stock, 1491 billion USD in the year 2017 (UNCTAD, 2018). Keeping in view the significance of the topic; therefore, this study empirically tests the relationship between FDI and financial development. In understanding the role of financial development in FDI both in long- as well as in short-run would of great help mainly to comprehend the implications of financial development on FDI.

The transition from planned to market economy necessitates the establishment of an almost entirely new set of financial institutions. Currently, foreign banks only account for 1.6% of the Chinese banking sector. 6.4% of the country's insurance business belongs to foreign investors. China's equity market has been significant net capital inflows from foreign investors. They held more than 1.68 trillion Yuan worth of Chinese domestic stocks, by the end of the first quarter of 2019. The increase is above 30% in just three months, and it is the biggest quarterly rise in the last six years.

Several factors affect foreign direct investment. Foreign firms invest in countries with large *market size* (Bevan and Estrin, 2004), *better institutional quality* (Wei, 2000), *abundant natural resources* (Kang and Jiang, 2012), *technology* (Kang and Jiang, 2012), *taxes incentives* (Azémar and Desbordes, 2013), and *trade openness* (Doytch and Eren, 2013). However, there is scarce literature about *financial development* as a determinant of FDI (Desbordes and Wei, 2017). Moreover, financial development plays a vital role in attracting foreign investors into the host economies. It means that countries with well-developed financial institutions can attract FDI. Similarly, financial openness in the form of FDI (capital inflow) can also influence the financial sector of the host countries. Financial development can affect FDI through various channels. The channels are consist of allocative efficiency, transaction cost reduction, enforcement

¹ The Bank of China, the China Construction Bank, the Industrial and Commercial Bank of China, and the Agricultural Bank of China.

contract, and liquidity. The empirical literature shows that financial is affected by institutional quality (Khan et al., 2019a), social capital (Guiso et al., 2004), trade openness (Baltagi et al., 2009), financial openness (Baltagi et al., 2009), and foreign direct investment (Aibai et al., 2019).

Previous studies focused on cross-countries analysis, e.g., Desbordes and Wei (2017). Analysis in cross-countries framework involves heterogeneity and cross-sectional dependence. Similarly, the problem of endogeneity may arise (You and Solomon, 2015). Each country is different for social, political, and economic aspects. Therefore, the relationship in cross-country analysis may produce misleading results. Addition to this, past literature documents a traditional measure of financial development, e.g., "*real domestic credit to private sector per capita*," "*stock market capitalization to GDP*," and "*ratio of private credit to GDP*." However, these indicators lack multidimensionality of the FD. Analysis with these indicators may produce misleading results. To circumvent a potential omitted variable, we incorporate a more comprehensive dataset of FD introduced by the IMF (International Monetary Fund), since it provides a more fine-grained analysis. Our study revisits the nexus of FD and FDI in China's perspective. Moreover, our study is based on a macro level, e.g., China, to have in-depth knowledge of the relationship between FDI and FD.

The rest of the paper proceeds as follows. Section 2 is related to financial development in China. The third section deals with the theoretical framework and data. Section 4 documents the method and results followed by concluding remarks.

2. Overview of financial development in China

Financial development plays a vital role in the economic development of China. The financial sector of China facilitates funds, manage the liquidity risks and risk management, etc. It helps in promoting efficiency, innovation, and industrial upgrading. China has various kinds of financial institutions. The institutions consist of banks, insurance companies, capital market, financial technology, Tencent, Alibaba, e-commerce, etc. China's stock market is vital for retail investors because they do not spend a lot of time in analyzing balance sheet and income statements like the

US individual investors do. The foreign participation in the Chinese financial sector is limited since it is still, to a more considerable extent, is domestic.

2.1. Money market

Money market of China consists of state-owned big four banks and other small commercial banks. China has the largest banking system among the countries that are passing through central planning to market-based economies. Keeping in view the ratio of assets to deposit banks to GDP, the credit market of China is larger than many of the developed countries. Since the opening up reforms in 1990, the money market institutions gone through transitions and reforms.² In this regard, China established four big banks (commercial in nature) and a central bank. The four big consists of the Bank of China (BOC), China Construction Bank (CCB), the Agricultural Bank of China (ABC), and Industrial & Commercial Bank of China (ICBC). People's Bank of China was established as the central bank of China. At the core of reforms, non-state commercial banks transformed to do the operation. The foreign banks were limitedly allowed, and the urban credit cooperatives were transformed into commercial banks in 1996. Moreover, the opening-up reforms in 1990 led the government of China to separate the policy banks from the commercial banks.

From 1985 to 1992, the government of China established small and medium-sized commercial banks in various regions and cities to create efficiency and competition amongst the institutions related to the money market. The banks were responsible for providing various kinds of financial services to households and firms and composed of Huaxia Bank, China Everbright Bank, China Merchants Bank, the Shenzhen and Guangdong Development banks, the CITIC Industrial, and the Bank of Communications. Many of the commercial banks are joint-stock, i.e., shareholder-owned. Commercial papers, FED funds, REPO, Treasury bills, negotiable CDs, and bankers' acceptance are the instruments that are traded in the money market of China.

2.2. Capital market

² The implication and benefits of the money market reforms is a hot debate for financial economists. It is viewed that miraculous economic development and the preservation of high saving rates of China are the results of the banking reforms (e.g., Murrell, 1995; Walder, 1995). The market reforms in 1990 are conditional upon its successful performance (Jin, 2011). Financial economists are of the view that the reform strategy may not be suited for other transition economies (Sachs et al., 2006; Woo, 1994).

China is fighting against financial risks; however, it also needs to maintain space for market vitality. China is the second-largest equity market and the third-largest bond market. At this point, China needs to open its economy by attracting more multinational enterprises (MNEs). It needs to deploy a way to diversify the national wealth on a global scale.

The transition of the Chinese economy, as a result of the economic liberalization in the late 1970s, demands market-oriented resource allocation. The situation has given birth to the capital market of China. The Shenzhen Stock Exchange (SZSE) and the Shanghai Stock Exchange (SSE) were established in 1991 and 1990 to promote reforms of SOEs (state-owned enterprises). The development of the capital market of China passes through three stages. The stage-I is spanning from 1978 to 1992, where Chinese companies are incorporated with the capital markets. The second stage is spanning from 1993 to 1998, where the CSRC (China Securities Regulatory Commission) was established, and it is considered as a milestone for the Chinese economy. With the promulgation of Securities Law, the third stage (from 1998 till date), is also considered a very crucial phenomenon for the development of the capital market and the Chinese economy.

For securities, the structure of SSE and SZSE are decomposed into stocks, bonds, and funds. Two kinds of *stocks* are traded in SSE: "A" shares and "B" shares. The two kinds of shares are in two currency units: Yuan and USD. The A-shares' prices are expressed in Yuan, while B shares are quoted in USD. The trading of A-shares was not allowed to foreign investors until 2002. However, with the promulgation of reforms like the Qualified Foreign Institutional Investor (QFII) program, now the foreign investors are allowed to trade in A-share. Similarly, trading in B-share is allowed to both the domestic and foreign investors since 2001.

During the last four decades, China's bond market has been grown significantly. Currently, it the third largest market in the World. Similarly, it is the most important part of China's capital market aside from the stock market (Zhen, 2013). Various kinds of *bonds* traded in SSE, i.e., convertible corporate bonds, corporate bonds, and treasury bonds (T-bond). Corporate bonds were introduced long after the development of the capital market. One-half of one percent of GDP consists of corporate bond in 1999 (*People's Daily*, September 1, 2000). Besides the giant SOEs, local firms were encouraged consistently to issue corporate bonds after 2000 with the issuance of new reforms. China's financial system still faces some structural issues which need

to be resolved to attract more foreign capital interests. The establishment and its development, the *fund's* market passed into three phases, i.e., the pilot phase, the phase of fund market restructuring, and the market-oriented development phase. Since its establishment in 1998, the funds market is achieving considerable progress by taking proactive steps in development in the last twenty-two years.

3. Construction of model and data collection

3.1. Financial development and FDI

Financial development plays a vital role in attracting foreign investors. It means that countries with better financial institutions and financial infrastructure can attract more FDI. The importance of financial development is acknowledged in past literature (Desbordes and Wei, 2017). Similarly, financial openness in the form of FDI (capital inflow) can also influence the financial sector of the host countries. Financial development can affect FDI through various channels. The channels are consist of allocative efficiency, transaction cost reduction, enforcement contract, and liquidity.

The allocative channel is the most important part of financial intermediation. The allocative channel enables the foreign firms to reduce risk by diversifying the portfolio and invest the resources in a project with a higher rate of return (Claessens and Laeven, 2003; Fosu, 2003; Ncube, 2007). The financial development enables the entities and individual investors to access external funds at a lower cost (Guiso et al., 2009). Therefore, the allocative efficiency occurs through financial development with the optimal use of allocation funds.

Financial institutional, through its intermediation aspect, can allocate the investor's assets and reduce the transaction's cost. The transaction efficiency aspect of financial development means the allocation of funds with lower fees at a lower cost of the transaction. For example, it is quite difficult for foreign firms with a lack of knowledge about the host economies can easy undertake investment by contracting interested parties through financial institutions. Without the presence of financial institutions, it would rather tricky for investors to invest in foreign countries. Hence the financial sector facilitates firms by providing market and utility services, provide the needed

information; and reduce transaction costs (Bartels et al., 2009). It implies that financial development can reduce the transaction's cost, enforce the contract, ease the information flow, hence create economic efficiency (Hermes and Lensink, 2003; Levine, 1999; Méon and Weill, 2010).

One problem that can cause the markets to fail is asymmetric or incomplete information. Financial development in case of asymmetric information can help the investors in decision making. If the asymmetric and hidden information results in adverse selection, then the only products available on the market are of low quality. Therefore, financial institutions help in the enhancement of capital mobility by reducing the flow of asymmetric information (King and Levine, 1993).

Financial development helps in facilitating the enforcement of financial contracts (Mendoza et al., 2007). From the perspective of contract enforceability, financial development may be termed as the extent to which financial contracts are enforceable. The financial contract enforceability may be limited or full. In the case of limited enforceability, the only mechanism for consumption smoothing is the accumulation of non-contingent assets. Idiosyncratic risk can be mitigated through the enforcement of financial contracts (complete markets).

By facilitating financial instruments and trade settlements, financial institutions increase liquidity (Levine, 1999). Market liquidity and funding liquidity are the two forms of financial liquidity. The absorption of transactions, through the ease of trading (market liquidity) and the ease of borrowing (funding liquidity), enhances the liquidity of the financial system (Brunnermeier and Pedersen, 2009). Similarly, the well developed financial system may help the existent firms and allowing the creation of new firms (Rajan and Zingales, 1998).

The presence of a well developed financial system enhances economic development; however, the absence of sound financial creates problems. The less developed financial system may create problem in ease of doing business, therefore, limit the FDI flows and their impacts on the host economies. Alfaro et al. (2008) argue that weak financial institutions of the developing countries can limit the potential benefits of foreign investment. Similar results were reported by Lee and Chang (2009). They argue that financial development in host countries is necessary for the potential benefits of foreign investment in economic growth. Hence, in their model, financial

development is an endogenous factor that affects FDI and growth relationship. On the same lines, Ang (2008) reported that besides trade openness and infrastructure, financial development is a vital factor that attracts FDI in Malaysia.

Conversely to the positive relationship between FDI and FD, there is a notion that financial development may not necessarily be the important determinant for FDI flow to the developing countries. The debate continues. Claessens et al. (2001) argue that in developing countries, the FDI may be a substitute for the less developed financial sector. Therefore, empirical investigation is necessary to check the relationship between financial development and FDI.

Previous literature focused on the stock market capitalization to GDP or the ratio of private credit to GDP. The proxies used by earlier may not exhibit an accurate picture of the financial development and lacks the *policy implications*. Keeping in view the *limitations* in previous literature, we rely on the financial development index developed by the IMF (International Monetary Fund). Svirydzenka (2016) argue that the index covers the multidimensional nature of financial development, i.e., financial market and financial institutions. Moreover, the index covers financial depth, access, and efficiency of financial markets and institutions.

3.2. *Institutional quality and FDI (efficiency-seeking)*

Social, political, economic elements of countries constitute an institutional framework (North, 1990). The elements are interacting with business activities to determine the profitability of a firm. Institutional aspect is the crucial determinant of firms profitability by reducing the transaction and transformation costs (Khanna and Rivkin, 2001; North, 1990). Similarly, institutional elements form the basis for production and exchange (Sobel, 2002). Therefore, in addition to traditional factors, foreign enterprises choose those countries as their investment destinations, where they find well-developed political, social, and economic institutions (Dunning, 2013). Moreover, institutions play a vital role in understanding the internalization pattern (Arregle et al., 2016). Similarly, perceived distance is an essential aspect of investment's decisions. Ghemawat (2001) argue that cultural, administrative, geographical, and economic distance among countries is more important for reducing business costs and ease of doing business. The poor institutional quality increases the perceived distance between the host and home countries and hence increase the transaction costs. Therefore, institutional integrity matter

more than absolute restrictions. Similarly, institutional quality matters for financial development (Khan et al., 2019a, 2019b; Law and Azman-Saini, 2012). Cherif and Kaouther (2008) argue that policymakers should take into consideration the institutional quality because well-developed institutions reduce uncertainty and largely explain the financial development of the country.

We rely on the International Country Risk Guide (ICRG) data. The data consists of government effectiveness, the rule of law, bureaucratic quality, investment profile, democratic accountability, and control of corruption. The individual aspects may not portray an accurate picture of institutional quality when put in a regression. Following Buchanan et al. (2012); Globerman and Shapiro (2003), we apply Principal Component Analysis (PCA) to derive a composite index of institutional quality.

3.3. *Infrastructure and FDI (market-access)*

According to Shatz and Venables (2000), the motive for MNCs to invest abroad include better serving the local market. This is called 'horizontal' or 'market seeking' (market access motivation) FDI to have access to lower-cost inputs. The first motive is mainly driven by market size. This is a substitute for international trade that implies a duplication of production plants, i.e., to economize on tariffs, transport costs and to tap a new market. Since there is fragmentation, therefore, the second motive for MNCs is to have access to lower-cost inputs. It is called 'production cost-minimizing FDI' or 'vertical FDI' (resource access motivation). Infrastructure is like an amenity that can help in reducing the cost of production. Hence it is believed that it has relatively more influence on vertical FDI though it also has an impact on horizontal FDI.

Our study relies on the data of *transport infrastructure* developed by (Donaubauer et al., 2016). The authors used 30 indicators and constructed a composite index which they name 'Global Infrastructure Index.' The global infrastructure composite index is composed of four sub-indices. The indicators used in the construction of the Global Infrastructure Index based on transport (land, air, and sea transport), Internet & Telecommunications (ICT), energy (production and consumption of energy), and financial infrastructure. The data in its original form is available from 1990 to 2010. Following Cooray et al. (2017), we interpolate the missing data.

3.4. *Economic size and FDI (market-seeking)*

Foreign firms choose the countries as their destination with a huge market size. Previous literature used GDP per capita as a proxy for market size. Chakrabarti (2001) argues that the only variable that passed through the robustness check is the GDP per capita of the host countries. Similarly, an increase in market size influences the demand for financial services (Menyah et al., 2014). Since the opening-up reforms in 1978, the GDP per capita has been increased around 5090% in 2016 (World Bank, 2018).³ We use GDP per capita (current USD) from World Bank (2018).

3.5. Natural resources and FDI (resource-seeking)

Natural resources rent is the sum of coal rent, natural gas rent, oil rent, mineral and forest rents. MNEs target their operations in countries with abundant natural resources (Dunning, 1988). Past literature shows that the impact of natural resource rents on financial development is ambiguous (Dwumfour and Ntow-Gyamfi, 2018). The impact of natural resource rents on financial development is conditional on macroeconomic and institutional variables. In China, the total natural resources rents (% of GDP) have been increased by 38% from 1970 to 2016. We derive data about total natural resources rents (% of GDP) from World Bank (2018).

3.6. Domestic investment and FDI (supply-access)

Domestic investment plays a vital role in attracting foreign direct investment through the forward (*market access*) and backward (*supplies access*) linkages (Javorcik et al., 2018). The domestic investment may help foreign investors through the supply of necessary materials, logistic support, and technical workforce. The domestic investment in China has been increased from 19.21 billion USD to 4.78 trillion during 1960-2016, and the increase is around 24816%.⁴ We use gross fixed capital formation (current US\$) as a proxy for domestic and data comes from World Bank (2018).

3.7. Trade openness and FDI

China's opening-up reforms and its accession to WTO (World Trade Organization) is one of the remarkable phenomena of the globalization. The trade share in GDP has been increased from

³ Authors' calculations based on World Bank data.

⁴ Authors' calculations based on World Bank data.

9.64% in 1978 to 37.03% in 2016. Openness modeled by a tariff reduction explains foreign investments. Similarly, Trade openness and capital account liberalization foster financial development (Baltagi et al., 2009; Le et al., 2016). Open economies face uncertainties and demand for the establishment of a well-developed financial system and instruments that may hedge against exchange rate fluctuations. An increase in trade influence the demand for financial services (Menyah et al., 2014). We use trade (% of GDP) as a proxy for trade openness and data comes from World Bank (2018).

4. Methods and results

To comprehend the relationship between FDI and FDI, we use the ARDL (autoregressive distributive) procedure, developed by Pesaran et al. (2001). There are several advantages to use the ARDL approach. First, the method is applicable irrespective of the order of integration of variables, i.e., $I(0)$, $I(1)$, $I(1,0)$. If the variables are $I(2)$ or above, then the F-statistics is not invalid (Ouattara, 2006). Second, ARDL is applicable in case some of the regressors are endogenous (Odhiambo, 2009). Third, the method is effective even in the case of small samples (Ghatak and Siddiki, 2001). In case of small samples, the method is better than Johansen and Juselius (Johansen, 2006), Engle & Granger (Engle and Granger, 2006), and Phillips and Hansen (Phillips and Hansen, 1990). Another advantage of using ARDL is that it overcomes the problems, resulting from series with unit roots and the unrestricted error correction model (UECM) seems to take satisfactory lags that captures the data generating process in a general-to-specific framework of specification (Laurenceson James; Chai C.H. Joseph, 2003). We aim to investigate the causal relationship between sectoral FDI and infrastructure across different specifications.

Before the estimation of the empirical results, it is imperative to determine the order of integration. In this regard, we use Augmented Dicky Fuller (ADF) test. We also apply the Phillips- Perron (PP) test to get robust results. Moreover, we also apply the Zivot-Andrews breakpoint unit root test to avoid misleading and biased results. We follow Ayala and Triguero (2017) and apply Baum's modified methodology for unit root testing against the alternative of trend stationarity with a shift in time trend, shift in mean, and a shift in both slope and intercept.

[Table 1](#) reports the results of the unit root. All the tests show that none of our variables is integrated of I(2). Similarly, there is mix integration of variables, i.e., some variables are integrated of I(0) while others are I(1). Moreover, the response variable is integrated of order I(1), which satisfied the precondition specified by Pesaran et al., (2001).

Table 1. Unit root and stationary test results.

Variable	ADF		Phillips- Perron		Zivot-Andrews					
	I(0)	I(1)	I(0)	I(1)	Zd	Break	Zt	Break	Zdt	Break
FDI	-3.58**	-6.02***	-2.99	-11.59***	-5.48***	1999	-4.97***	2004	-5.35**	1996
FD	-1.27	-5.99***	-1.24	-6.00***	-2.14	2014	-4.82**	2004	-6.30***	2000
IQ	-1.853	-5.22***	-3.35*	-5.49***	-3.723	1995	-3.832	1999	-4.8	2001
INF	-3.492*	-7.36***	-3.56*	-7.25***	-3.985	1995	-4.086	2000	-4.166	2008
TO	-0.75	-3.58*	-0.974	-3.62**	-4.504	2013	-4.148	2011	-4.912*	2013
DI	-3.83**	-3.71**	-2.264	-3.52*	-4.497*	2015	-4.717**	2014	-5.839***	2011
RR	-2.85	-7.55***	-2.92	-7.70***	-4.80*	2003	-3.18	2012	-4.51	2003

Note. * p<0.10, ** p<0.05, *** p<0.01. ADF and PP tests include intercept and trend. The ZA tests are the minimum Dicky–Fuller statistics with one structural break in intercept (Zd), trend (Zt), and both intercept and trend (Zdt). Break indicates the year when minimum DF statistic is obtained.

The next step is to apply the ARDL bounding testing procedure of cointegration. The bound test provides us with F-statistics whether cointegration exists or not. If the F-statistic value is higher than upper-bound, then there is cointegration. Similarly, the values of the F-statistic below the lower bound value indicate no cointegration. While the F-statistic value between the upper and lower bound indicate inconclusive region.

In order to investigate the relationship between financial development and foreign direct investment, we can formulate the unrestricted error correction model (ECM) as the following;

$$\Delta FDI_t = \alpha_{0fdi} + \sum_{i=1}^p \psi_{ifdi} \Delta FDI_{t-i} + \sum_{i=1}^p \rho_{ifdi} \Delta FD_{t-i} + \sum_{i=1}^p \phi_{ifdi} \Delta IQ_{t-i} + \sum_{i=1}^p \delta_{ifdi} \Delta INF_{t-i} + \sum_{i=1}^p \rho_{ifdi} \Delta GDPPC_{t-i} + \lambda_{1fdi} FDI_{t-1} + \lambda_{2fdi} FD_{t-1} + \lambda_{3fdi} IQ_{t-1} + \lambda_{4fdi} INF_{t-1} + \lambda_{5fdi} GDPPC_{t-1} + \mu_t \text{ -----Equation(2)}$$

$$\Delta FD_t = \alpha_{0fd} + \sum_{i=1}^p \psi_{ifd} \Delta FD_{t-i} + \sum_{i=1}^p \phi_{ifd} \Delta FDI_{t-i} + \sum_{i=1}^p \rho_{ifd} \Delta IQ_{t-i} + \sum_{i=1}^p \delta_{ifd} \Delta INF_{t-i} + \sum_{i=1}^p \rho_{ifd} \Delta GDPPC_{t-i} + \lambda_{1fd} FD_{t-1} + \lambda_{2fd} FDI_{t-1} + \lambda_{3fd} IQ_{t-1} + \lambda_{4fd} INF_{t-1} + \lambda_{5fd} GDPPC_{t-1} + \mu_{2t} \text{-----Equation(3)}$$

In Eq. (2), the term FDI is the foreign direct investment. Similarly, the dependent variable in the Eq. (3), is represented by FD. The control variables are represented by IQ (institutional quality), INF (transport infrastructure), and GDPPC (per capita GDP). To have in-depth analysis and robustness of results, we repeat the same methodology by adding the trade openness (TO), domestic investment (DI), and natural resource rents (RR) in the above equations. The subscript t is the time dimension. ARDL technique is applied to the model for identification of the long- and short-run dynamics. Pesaran et al. (2001) provided upper and lower bound critical values. However, the values are applicable for large samples. In the case of small samples, the decision based on the Pesaran et al. (2001) critical values can mislead the estimation results (Herzer, 2010). If the computed F-statistic falls above the upper value bound, the null is rejected, indicating cointegration. If the computed F-statistic falls below the lower bound, the null hypothesis of no cointegration is accepted. In contrast, if the computed F-statistic falls within the bounds, the inference would be inconclusive.

The significant F-statistics of the estimated ARDL bound test in [Table 2](#) both for foreign direct investment and financial development, reject the null of no cointegration. This implies that a stable long-run relationship between FDI and financial development exist.

Table 2. ARDL bounds test results.

FDI as dependent variable			FD as dependent variable		
Models	Max lag.	F-Stat.	Models	Max lag.	F-Stat.
F(FDI/FD, IQ, ,INF, GDPPC)	4	12.41***	F(FD/FDI, IQ, ,INF, GDPPC)	4	4.84**
F(FDI/FD, IQ, ,INF, GDPPC, TO)	3	10.71***	F(FD/FDI, IQ, ,INF, GDPPC, TO)	4	12.65***
F(FDI/FD, IQ, ,INF, GDPPC, DI, TO)	3	8.71***	F(FD/FDI, IQ, ,INF, GDPPC, TO, DI)	3	3.58*
F(FDI/FD, IQ, ,INF, GDPPC, TO, DI, RR)	2	9.52***	F(FD/FDI, IQ, ,INF, GDPPC, TO, DI, RR)	2	3.66*

Note. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The first letter outside the brackets denotes dependent variables. The null hypothesis of no cointegration is tested with F-test, critical values are taken from Narayan (2005). Lag selection is based on the AIC. For upper and lower bound critical value; please see [Appendix Table A1](#).

Hence, we generalize that there is a long-run relationship between FDI and financial development. We use Johansen's multivariate cointegration methodology to check the robustness of our results. The results are given in [Table 3](#). We see that there are three cointegrating vectors which validate the presence of a long-run relationship between the variables, which indicate the ARDL results are robust and reliable.

Table 3. The Johansen cointegration analysis.

Hypothesis	Trace statistic	Max.eigen value
$R=0$	239.3604***	67.16938***
$R\leq 1$	172.1911***	52.23843**
$R\leq 2$	119.9526***	37.40768*
$R\leq 3$	82.54495***	33.53039*
$R\leq 4$	18.956	14.27059

Note. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

In the next step, we reparametrize the equations that show cointegration. For this purpose, we document the following ARDL framework;

$$(1-\Omega_1L-\dots-\Omega_sL^s) FDI_t = \tau_0 + (1-\tau_1L-\dots-\tau_uL^u) FD + (1-\gamma_1L-\dots-\gamma_vL^v) IQ + (1-\pi_1L-\dots-\pi_wL^w) INF + (1-\phi_1L-\dots-\phi_xL^x) GDPPC + \mu_{3t} \text{-----Equation(4)}$$

$$(1-\Omega_1L-\dots-\Omega_sL^s) FD_t = \tau_0 + (1-\tau_1L-\dots-\tau_uL^u) FDI + (1-\gamma_1L-\dots-\gamma_vL^v) IQ + (1-\pi_1L-\dots-\pi_wL^w) INF + (1-\phi_1L-\dots-\phi_xL^x) GDPPC + \mu_{4t} \text{-----Equation(5)}$$

In the next step, we reparametrize Eq.(4) to (5). The step is done to obtain long-run coefficient estimates by including those equations that show cointegration. The long-run relationship between financial development and FDI and vice versa is presented in [Table 4](#). The left hand side of the Table reports the results when we use FDI as dependent variable. The right-hand side documents result when FD is used as dependent variable. For each side, there are four models. The models are derived by the inclusion of control variables in our baseline model. The results reveal that financial development's coefficients in all the specifications are significant and positive, which implies that financial development positively influences FDI inflow. Similarly, the reverse impact also holds. Coefficients of FDI are significant and positive, which shows that

FDI inflow is one of the reasons that boosted up the financial development in China. The results of control variables are according to the economic theory and prior expectations. The inclusion of control variables is robust to our analysis. Moreover, the inclusion of control variables in various specifications does not significantly change the results of our main variables of interest. The lower panel of the table reports diagnostic results. The diagnostic results show that our models are correctly specified.

Table 4. Long-run effects.

Variables	FDI is dependent variable				FD is dependent variable			
	Model1	Model2	Model3	Model4	Model1	Model2	Model3	Model4
FDI					0.02*	0.03**	0.05**	0.04*
					(0.01)	(0.00)	(0.02)	(0.02)
FD	0.28**	0.34**	0.30***	0.32*				
	(0.13)	(0.16)	(0.14)	(0.18)				
IQ	0.51*	0.49*	0.50**	0.43**	0.02*	0.04**	0.07*	0.06
	(0.29)	(0.28)	(0.22)	(0.20)	(0.01)	(0.02)	(0.04)	(0.01)
INF	0.25*	0.33**	0.31*	0.22	0.01	0.01	0.07*	0.04
	(0.14)	(0.14)	(0.17)	(0.14)	(0.02)	(0.01)	(0.04)	(0.03)
GDPPC	0.15*	0.18*	0.20**	0.17	0.04**	0.06*	0.10*	0.09**
	(0.08)	(0.10)	(0.09)	(0.11)	(0.02)	(0.03)	(0.06)	(0.04)
TO		0.02*	0.02	0.01		0.01**	0.02	0.04***
		(0.01)	(0.02)	(0.02)		(0.00)	(0.03)	(0.00)
DI			0.06**	0.07*			0.12*	0.15***
			(0.03)	(0.03)			(0.07)	(0.03)
RR				0.10**				0.01
				(0.04)				(0.00)
Constant	-2.66***	-5.20***	-5.38***	-2.52*	0.66***	0.50*	0.12	0.40***
	(0.68)	(1.31)	(1.42)	(1.30)	(0.13)	(0.07)	(0.37)	(0.14)
<i>Diagnostic Statistics</i>								
LM	2.083	2.41	3.19	2.49	2.99	4.07	2.07	1.126
	(0.17)	(0.13)	(0.08)	(0.15)	(0.11)	(0.10)	(0.16)	(0.30)
Reset	2.38	1.70	1.19	2.51	1.54	0.54	2.90	2.68
	(0.12)	(0.24)	(0.38)	(0.14)	(0.25)	(0.46)	(0.26)	(0.12)
ARCH	0.515	0.56	0.333	0.033	0.307	0.55	0.29	2.01
	(0.47)	(0.45)	(0.56)	(0.85)	(0.57)	(0.45)	(0.59)	(0.17)
Normality	0.22	0.61	0.72	0.48	0.77	3.25	1.18	0.14
	(0.89)	(0.73)	(0.70)	(0.78)	(0.68)	(0.20)	(0.55)	(0.93)
Cusum	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable
Cusum of squares	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable
F-statistic	11.815	13.734	12.103	10.186	102.07	52.067	35.138	76.103
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)

Note: standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. The null hypothesis of no cointegration is tested with calculated F-statistic, critical values are taken from Pesaran et al. (2001), please see Appendix Table A2. Lag selection is based on the AIC. Numbers in parenthesis are the p-values corresponding to the diagnostic tests.

If the long-run relationship exists (the necessary condition for cointegration but not a sufficient condition) then under the VECM environment, granger causality test show long-run and short-run causality for the two variables.

Under the VAR framework, traditional Granger causality test can produce ambiguous results; therefore, under the VECM framework the following is its improved version;

$$\Delta FDI_t = \alpha_{0_{fdi}} + \sum_{i=1}^p \psi_{ifdi} \Delta FDI_{t-i} + \sum_{i=1}^p \rho_{ifdi} \Delta FD_{t-i} + \sum_{i=1}^p \phi_{ifdi} \Delta IQ_{t-i} + \sum_{i=1}^p \delta_{ifdi} \Delta INF_{t-i} + \sum_{i=1}^p \delta_{ifdi} \Delta GDPPC_{t-i} + \Omega_1 ECT_{t-1} + \mu_{5t} \text{-----Equation(6)}$$

$$\Delta FD_t = \alpha_{0_{fd}} + \sum_{i=1}^p \psi_{ifd} \Delta FD_{t-i} + \sum_{i=1}^p \rho_{ifd} \Delta FDI_{t-i} + \sum_{i=1}^p \phi_{ifd} \Delta IQ_{t-i} + \sum_{i=1}^p \delta_{ifd} \Delta INF_{t-i} + \sum_{i=1}^p \delta_{ifd} \Delta GDPPC_{t-i} + \Omega_2 ECT_{t-1} + \mu_{6t} \text{-----Equation(7)}$$

To reach in long-run equilibrium for the variables FD and FDI; ECTs (error correction term) are the speed of adjustment. The significant value of F-statistics indicates that short-run causality exists between the two variables, whereas the significant value of t-statistics for ECT_{t-1} indicates the long-run causality.

The results of the VECM are given in [Table 5](#). The long-run relationship is confirmed by the ECT terms that are significantly negative in FDI equations. The long-run ECT is the speed of adjustment to restore equilibrium. Similarly, ECT terms are significantly negative in all the FD equations. Here we note that there is a long-run bidirectional causal relationship between financial development and FDI. The significant value of F-statistics determines the short-run causality. The causality is determined by the F-statistics to test the joint significance of all the lagged first differences of independent variables (Ali and Wang, 2018; Kevin Honglin Zhang, 2001; Lee, 2010). We see that short-run bidirectional causality exists between FD and FDI.

Financial development affects FDI in financially vulnerable sectors. Reverse causality also holds when the entry of foreign banks increase the efficiency of domestic financial institutions and banks. For example, Citibank, Morgan Stanley & Co., etc. have greatly influenced the efficiency of China's financial institutions. Manova (2013) argue that borrowing in destination countries and foreign demand for goods manufactured by sectors intensive in external finance can lead to an increase in financial development and foreign investment. At the initial stage, the foreign firms face fixed costs to establish a new business. The ability of firms to finance the upfront fixed costs of FDI with internal funds varies across sectors. Some sectors are technologically

more dependent on external finance. Investments exceed the MNC's internal cash flows can be financed through borrowing from the host countries' banks.

Table 5. Granger causality results.

<i>FD to FDI</i>		
Specifications	Short Run (F-Stat)	Long-run ECT _{t-1}
F(FDI/FD, IQ, ,INF, GDPPC)	4.16**	-0.55*** (0.08)
F(FDI/FD, IQ, ,INF, GDPPC, TO)	3.76**	-0.45*** (0.12)
F(FDI/FD, IQ, ,INF, GDPPC, DI, TO)	3.39*	-0.58*** (0.15)
F(FDI/FD, IQ, ,INF, GDPPC, TO, DI, RR)	3.26*	-0.40** (0.14)
<i>FDI to FD</i>		
F(FD/FDI, IQ, ,INF, GDPPC)	4.06**	-0.60*** (0.21)
F(FD/FDI, IQ, ,INF, GDPPC, TO)	7.27**	-0.56* (0.30)
F(FD/FDI, IQ, ,INF, GDPPC, TO, DI)	3.57*	-0.19* (0.11)
F(FD/FDI, IQ, ,INF, GDPPC, TO, DI, RR)	3.11*	-0.62** (0.30)

Note. * p<0.10, ** p<0.05, *** p<0.01.

China's financial development and FDI inflows are the two important phenomena of the recent globalization. Chinese economy has undergone through transition. The *banking and insurance regulator, CBIRC*, is determined to attract foreign capital by introducing market-based financial reforms. The measures and reforms increased opportunities for MNEs in the country's lucrative financial market. The four state-owned banks, the big four, are also playing their role in financial intermediation. China is the second-largest economy, and the second-largest equity market and the third-largest bond market. Shenzhen Stock Exchange (SZSE) and the Shanghai Stock Exchange (SSE) were established to allocate resource according to the market demands. Other financial institutions include banks, insurance companies, capital market, financial technology (fin-tech), Tencent, Alibaba, e-commerce, etc. These institutions have greatly influenced the FDI activities in the form of resource allocation, financial intermediation, the transaction cost reduction, enforcement of contracts, and the liquidity. Financial is responsible for promoting efficiency, innovation, and industrial upgrading.

The findings are consistent with the view that multinationals have significant complementarities with local industry and may stimulate development in host economies (Markusen and Venables, 1999). China's rate of return on capital, an essential measure of investment efficiency, far outstrips that of the most developed countries. MNCs motivate to invest in China due to an efficient financial sector, which increases in the rate of return on their investment. The results are in line with the findings of (Desbordes and Wei, 2017; Manova, 2013).

5. Conclusion and policy implications

Globalization and open-door policies boosted Chinese economy by attracting a huge amount of foreign direct investment. Similarly, in the meantime, the infrastructure also developed at the same time. Therefore, a natural question arises as to whether the FDI inflow is complementary to financial development or other factors explain the scenario? Similarly, we also investigate the role of financial development in the distribution of FDI.

Previous literature focused on the specific aspect of financial development, e.g., *real domestic credit to private sector per capita*. The results based on a single aspect, carry specification and omitted variable bias, and hence may not be appropriate for policy purposes. Keeping in view the limitations in previous studies, we revisit the FDI-financial development relationship in a broad set of financial indicators, e.g., the composite index of financial development. Since the spillover effect of FDI and financial development is conditional upon the sound institutional framework, therefore, we used institutional quality as our control variable. Applying the ARDL and VECM techniques, we came to know that there is a long-run bidirectional relationship between financial development and FDI. We also found that the financial sector positively affects FDI inflows in China. The reverse effect also holds. FDI influence financial sector.

Our research has some policy implications. The current market environment and the emergence of new banking services are pushing the Chinese government for market-based interest rate liberalization. Furthermore, the ownership limits in local banks and financial institutions should be increased to attract fresh capital. The asset requirements for foreign banks should be reduced. Finally, the requirements for foreign insurance brokers should be removed to engage in insurance

brokerage operations in China. Therefore, monetary reforms should be the priority of the Chinese government to attract foreign investments.

The current study is an endeavor to show the relationship between financial development and aggregated FDI. Future research should be targeted on the sectoral distribution of FDI to have in-depth knowledge about the topic.

Disclosure statement

The authors report no potential conflict of interest.

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Appendix

K	(1%)		(5%)		(10%)	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
1	6.02	6.76	4.09	4.66	3.30	3.79
2	5.2	6.3	3.5	4.4	2.9	3.7
3	5	6	3	4	2.7	3.6
4	4.3	5.8	3.1	4.2	2.5	3.6
5	4.134	5.76	2.91	4.193	2.40	3.517
6	3.976	5.691	2.794	4.148	2.334	3.515
7	3.864	5.694	2.73	4.163	2.277	3.498

Note: Critical values for the bounds test: Case II: restricted intercept and no trend. 'K' represents number of regressors.

Please note:

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The Editor