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The Influence of Business Environment on the Relationship between FDI and Economic Growth in China

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Abstract

China's growth and the significant increase in foreign direct investment (FDI) inflows have been evident over the past three decades. However, the growth rate of FDI has recently slowed down due to various factors. With the goal of stimulating FDI inflows, China has proposed a policy of "optimising the business environment". Addressing this phenomenon, the current study examined the relationship of FDI, business environment, and economic growth in China based on the retrieved annual data between 1986 and 2020. The bounds test for cointegration was performed to determine the existence of a long-term relationship involving these variables. The obtained results revealed the positive influence of FDI and business environment on China's economic growth. More importantly, the study found that a good business environment can enhance the positive influence of FDI on economic growth. Therefore, efforts to improve the business environment and attract FDI inflows are conducive to China's economic growth.

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1. Introduction

In this increasingly globalised economy, foreign direct investment (FDI) serves as a catalyst for economic growth (Tang and Tan, 2015; Banday *et al.*, 2021). Economic growth is an important goal when it comes to the development of a country. FDI can improve the levels of management skills and technology of the host country through training and knowledge transfer, resulting in enhanced productivity (Dritsakis and Stamatiou, 2014; Gherghina *et al*., 2019). Such as China, rapid economic growth is closely linked to the influx of foreign capital (Wei and Liu, 2001; Buckley *et al*., 2010). The investment efficiency of FDI is generally higher than that of domestic investment (Kueh, 1992). The influx of foreign capital has intensified competition in China's domestic market, which in turn has strengthened the overall strength of Chinese firms (Gaur *et al*., 2018). FDI promotes China's economic growth through three intermediary effects, namely employment, technology spillovers, and output efficiency (Luo *et al*., 2021). According to a report by China's Ministry of Commerce, although foreign-invested enterprises account for less than 3 per cent of China's enterprises, they contribute nearly half of China's foreign trade, one-quarter of the output value and profits of industrial enterprises above designated size, and one-fifth of tax revenue. Therefore, FDI is an important component of China's economy.

However, in recent years, various events like the re-industrialisation of developed countries, the COVID-19 epidemic, and the Russia-Ukraine conflict have led to a decline in global investment and increasingly fierce competition to attract foreign investment. In addition to this, China is grappling with the challenges posed by the US-China trade war and complex geopolitics. These factors put China at a disadvantage in attracting FDI. This is evident from the significant drop in the growth rate of FDI inflows, which plummeted from approximately 20 per cent in 2010 to a mere 2.05 per cent in 2020. Meanwhile, the growth rate of GDP in China dropped from about 10 per cent in 2010 to 2.35 per cent in 2020. In light of this, it is essential to cultivate new investment advantages in order to cope with the changes in the internal and external environments for economic growth. With respect to this, the Chinese government has proposed the optimising business environment policy to attract FDI and promote economic growth.

Numerous past empirical studies attested to the contributions of FDI to economic growth, but certain studies documented that economic growth is not the outcome of FDI inflows. For instance, Krugman (1983) pointed out that FDI only accounts for a small part of the total capital formation, and it can hardly be regarded as an important driving force for economic growth. Meanwhile, according to Griffin and Enos (1970), not all FDI inflows have a positive impact on the host country, and these FDI inflows may lead to environmental degradation, overexploitation of natural resources, price distortions, and other issues. In addition, Doraisami (2007) also pointed out that recipient countries are vulnerable to sudden outflows of foreign capital triggered by economic or political crises. Notably, a meta-analysis of Gunby *et al.* (2017), which encompassed 280 estimates from the Chinese studies, concluded that the impact of FDI on economic growth in China may have been overstated. As such, it is crucial to take a closer look on whether FDI effectively promotes economic growth in China.

Although the relationship between FDI and economic growth is hardly a new research area, the role of business environment in the relationship between FDI and economic growth in China has remained unexplored. As one of the countries in Asia, China attaches great attention in developing a friendly business environment in order to attract FDI for higher economic growth. In addition, the Chinese government has proposed the implementation of a higher standard of open economy by further optimising the business environment for high-quality economic development.

However, it must be acknowledged that China faces some key challenges in terms of the business environment and attracting foreign investment. As far as China's internal environment is concerned, owing to the ageing problem and rising labour costs, China's comparative advantage in providing low-cost labour has been taken over by other countries (Li *et al.*, 2012). Consequently, some foreign-funded enterprises have relocated from China and set up factories in India, Vietnam, Indonesia, Malaysia, and other countries. In addition, it is important to note that venture capital is influenced by the institutional and cultural context, especially when it comes to foreign venture capital. This presents a significant challenge for their investments in China (Bruton and Ahlstrom, 2003; Wang, 2016). In China, the government plays a crucial role in the economy. Thus, venture capital tends to be geographically concentrated and nationalised, with a preference for cooperation. The regulation of IPO and the active participation

of the state's active participation in capital investment have influenced venture capital activities. This has led to Beijing, Shenzhen, and Shanghai becoming leading destinations for venture capital, offering better investment opportunities and profit margins (Pan *et al*., 2016). However, there are some challenges in foreign venture capital. Wang *et al.* (2016) pointed out that China lacks a mature system to effectively support venture capital. Most Foreign Venture Capitalist Firms (FVCFs) are not eligible to register as Qualified Foreign Investment Vehicles (QFII) due to strict capital controls and other legal restrictions. To accommodate their investments in China, the FVCFs have established relationships with the Chinese government or state-owned enterprises (Guo and Jiang, 2013). This incomplete and inadequate investment environment retards FDI inflows.

Furthermore, China faces a serious external threat, the presence of the Sino-US trade war and the "re-industrialisation" of developed economies, such as Europe and the United States, may have weakened the Chinese economy and reduced attractiveness for FDI (Lee *et al.*, 2023). Influenced by factors such as the ideology of a Chinese threat and "de-Chinaisation", several countries have identified Sino-US tensions as a business risk in the Chinese market. Consequently, China's economy is facing significant challenges as the United States, Japan, South Korea, and the European countries attempt to supplant China's manufacturing industry with alternatives in Vietnam, India, Southeast Asia, South America and other regions (Lee, 2023). Furthermore, the threat extends beyond manufacturing to high-tech FDI. The U.S. President has signed an executive order that restricts U.S. entities from investing in semi-conductors and micro-electronics, quantum information technology, and artificial intelligence with China. In response to this, some European, Japanese and South Korean companies have followed suit by withdrawing their investments in China.

Therefore, the current study focused on exploring the influence of the business environment on the relationship between FDI and economic growth in China. The study's findings would not only enrich the existing body of literature on economic growth by unravelling variations found in earlier studies but also provide valuable insights for policymaking. Specifically, the obtained findings may guide policymakers, especially in optimising the positive influence of FDI on the overall economic growth.

The remainder of this paper is organised as follows: Section 2 provides a review of earlier studies, and Section 3 details the methodology and dataset

utilised in the current study. Section 4 presents and discusses the obtained empirical results and findings, while Section 5 provides conclusions with policy implications.

2. Literature Review

The demand for FDI has continued to increase over the past decades for both developed and developing countries. With the expansion of economic globalisation, FDI serves as a dominant factor that affects the economy and more importantly, an important channel of technology transfer and innovation (Konstandina and Gachino, 2020; Pandey *et al*., 2022). Accordingly, FDI typically occurs when an investor establishes a business or acquires assets in a foreign company. In most cases, FDI takes place in more open economies and involves capital investment and may also include management or technology investment (Kerner, 2014; Gherghina *et al*., 2019). It operates in an increasingly complex environment and has become increasingly qualified as a fulcrum to stimulate economic growth.

However, studies have presented mixed findings on the relationship between FDI and economic growth. Most prior studies supported the view that FDI is an important factor in promoting economic growth (Shen *et al.*, 2010; Sokang, 2018; Kumari *et al*., 2021). However, certain studies found that the FDI inflows exhibit either no significant impact or a negative impact on economic growth (Herzer, 2012; Mahembe and Odhiambo, 2016; Gunby *et al.*, 2017). This may be attributed to the excessive share of FDI that squeezes out domestic investment and increases the economy's dependence on foreign capital. As such, sudden withdrawals of FDI may collapse the economy of the host country (Wan, 2010). In addition, FDI in highly polluting industries in developing countries damage the environment and poses extra costs for economic development (Blanco *et al*., 2013; Asongu and Odhiambo, 2020).

Furthermore, Blomström, Lipsey, and Zejan (1994) discovered that FDI does not necessarily promote economic growth at all times and further elaborated that FDI can only promote the economic growth of a country that has reached a certain level of development. Likewise, Fortanier (2007) added that the effectiveness of FDI in promoting economic growth depends on the characteristics of the host country itself, such as trade openness and financial development. In another study, Balasubramanyam *et al.* (1996) revealed that the role of FDI in stimulating economic growth largely depends on the

business environment, such as the trade policy in the host country.

Meanwhile, earlier studies postulated that the business environment is limited to customers, competitors, suppliers, regulators, and other external groups that may affect the business operations (Kefalas and Schoderbek, 1973; Dess and Beard, 1984; Swamidass and Newell, 1987). With in-depth research on the business environment, studies have begun to consider quantifiable factors that represent the business environment. From a more comprehensive perspective, the business environment can be defined as the current or expected institutional and behavioural environments, which affect the risks and returns of enterprise development and the economic strength of a country or region (Worthington and Britton, 2006). Accordingly, Bah and Fang (2015) summarised business environment into five aspects, namely infrastructure, corruption, financial development, security environment, and environmental regulation. In another study, Civelek *et al.* (2016) considered multiple aspects, such as the comprehensive actions of national, social, financial markets, and other factors, as the influencing factors of business environment. In general, institutional quality, infrastructure, human capital, innovation, financial development, laws, and regulations are widely considered as factors related to the business environment (Jayasuriya, 2011; Wang *et al.*, 2022).

The relationship between the business environment and FDI has gained growing research interest, and studies have proposed that the optimisation of the business environment is conducive to increasing the FDI inflows (Krifa-Schneider and Matei, 2010; Morris and Aziz, 2011). For instance, Piwonski (2010) found that the increase in the ranking of business environment indicators by one rank would bring more than US$40 million in FDI inflows to the host country and further concluded the correlation between government behaviour and FDI.

Meanwhile, other prior studies observed the varying effects of the business environment on FDI for different countries. For instance, Corcoran and Gillanders (2015) found that a high-quality business environment is conducive to increasing the FDI inflows but noted that this conclusion is not applicable for Sub-Saharan Africa, the world's poorest region and the OECD countries. However, the study demonstrated that the improvement of the business environment is more important for the middle-income countries.

Apart from that, several past studies demonstrated the importance of the business environment and highlighted the negative consequences of a

weak business environment to economic growth. For example, poor financial development reduces capital investment and causes improper allocation of resources. Problems like backward infrastructure, corruption, and criminal activities cause companies to experience significant loss of sales, resulting in a decline in total output and factor productivity (Bah and Fang, 2015). A study based on African countries showed that optimising the business environment can improve women's labour participation rate, which is conducive to promoting social equity and creating economic efficiency (Ncube *et al.*, 2021).

Accordingly, a business environment is an important guarantee for economic growth, and it plays direct and indirect roles in promoting economic growth. In terms of the direct effect, the business environment can improve factor productivity and resource allocation efficiency, promote entrepreneurship and economic transformation, and stimulate market vitality (Zhong and Chen, 2023). As for the indirect effect, the business environment is conducive to improving enterprise innovation efficiency and operation efficiency, accelerating talent flow (Wang *et al*., 2023), attracting FDI inflows, and stimulating the spillover effect of foreign investment for higher economic growth (Bayraktar, 2013).

In short, numerous prior studies examined the relationship between FDI and economic growth but resulted in mixed findings with no unified conclusion. Moreover, the contributions of business environment have been inconsistent. Despite the extensive studies on the relationship between FDI and economic growth, only a few studies focused on the influence of the business environment on the relationship between FDI and economic growth, particularly in China, a large and rapidly growing country in Asia. In view of the above, it was deemed essential for the current study to address these identified gaps in the literature.

3. Methodology and Data

3.1 Theoretical Model

The following Solow's model of economic growth served as this study's theoretical framework to examine the influence of business environment and FDI on economic growth in China:

$$Y_t = K_t^{\alpha}\left(A_t L_t\right)^{1-\alpha} \tag{1}$$

where Y_t denotes the output; K_t refers to the physical capital stock, including foreign direct investment (FDI) and domestic investment (DI); A_t is the labour-augmenting factor determining technological progress and economic efficiency; L_t is labour input; the coefficients of α and 1-α are the marginal product of capital and labour, respectively.

However, the neoclassical theory of economic growth assumes $\alpha < 1$, implying the diminishing rate of marginal return on capital. Assuming that the growth rate of technology (g) is constant, A_t is rewritten as follows:

$$A_t = A_0 e^{gt} \mathrm{BE}_t^{\theta} \tag{2}$$

Where g refers to growth rate of technology and BE indicates the level of business environment.

Based on this model, labour-augmenting technology (i.e., factor A_t) relies not only on the exogenous technological advancement but also on the business environment (BE), as business environment significantly influences the degrees of technological progress and economic efficiency (Wang, Cui, and Dong, 2023). Assuming that labour input, L_t, grows at a constant rate, n, then L_t is rewritten as follows, where n indicates the exogenous growth rate of labour:

$$L_t = L_0 e^{nt} \tag{3}$$

Accordingly, the increase in both labour input, L_t, and technology level, A_t, at a constant rate indicate that technological progress makes labour more effective. The capital per effective labour is represented as k_t=K_t /$A_t L_t$, where $A_t L_t$ represents effective labour input.

Capital accumulation is a crucial component in Solow's model of economic growth, as new capital investment improves the long-term economic performance. One of the basic assumptions of the Solow's model is that all savings is used for investment. In literature, capital accumulation is measured by the change in the stock of physical capital, K_t, and it can be represented mathematically as K_t=sY_t-δK_t, where s is the rate of savings; sY_t denotes savings; δ is the rate of capital depreciation.

If capital stock, K_t, and output, Y_t, are expressed in terms of per unit effective labour, then the dynamics of capital accumulation per unit effective labour, incorporating factors like n and g, is written as follows, where k grows and eventually converges to the steady-state point at k^*:

$$\dot{k}_t = sk_t^{\alpha} - (n + g + \delta)k_t \tag{4}$$

As capital per labour is presumed to remain constant at the steady-state level, the capital accumulation function can be more precisely defined as follows:

$$k^* = \left[\frac{s}{(n + g + \delta)}\right]^{\frac{1}{(1-\alpha)}} \left(\frac{Y_t}{L_t}\right) \tag{5}$$

$$= A_t \left[\frac{s}{(n + g + \delta)}\right]^{\frac{1}{(1-\alpha)}} \tag{6}$$

where Y_t/L_t denotes output per labour (expressed in terms of per capita GDP).

Following that, Equation (2) is substituted into Equation (6). With the application of natural logarithm, the following growth model is obtained:

$$\ln\text{GDP}_t = \ln\text{A}_0 + \theta\ln\text{BE}_t + \frac{\alpha}{1-\alpha}\ln s_t - \frac{\alpha}{1-\alpha}\ln(n + g + \delta)_t \tag{7}$$

Considering $\ln\text{A}_0=\beta_0+\varepsilon_t$, and the assertion by Mankiw et al. (1992) that savings (s_t) are equal to investments (comprising both domestic and foreign investments), the growth model can be reformulated after investments are segregated into domestic investment (DI) and foreign direct investment (FDI):

$$\ln\text{GDP}_t = \beta_0 + \beta_1\ln\text{FDI}_t + \beta_2\ln\text{DI}_t + \beta_3\ln\text{PG}_t + \theta\ln\text{BE}_t + \varepsilon_t \tag{8}$$

where $\ln\text{GDP}_t$ is the logarithm of per capita real GDP; $\ln\text{FDI}_t$ is the

logarithm of per capita real FDI inflows; $\ln BE_t$ is the logarithm of the business environment; $\ln DI_t$ is the logarithm of per capita real domestic investment; $\ln PG_t$ is the $\ln(n+g+\delta)_t$.

In addition, the study considered the addition of an interaction item into the regression model to examine the moderating effect of business environment on the relationship between FDI and economic growth:

$$\ln GDP_t = \beta_0 + \beta_1 \ln FDI_t + \beta_2 \ln DI_t + \beta_3 \ln PG_t + \theta \ln BE_t + \gamma \left(\ln FDI_t \times \ln BE_t \right) + \varepsilon_t \tag{9}$$

If $\gamma \neq 0$ and is statistically significant, then this implies that FDI and business environment interact and jointly influence the economic growth in China. At the same time, this also implies no direct interpretation for the coefficient of individual variable, as these variables are interdependent (Wooldridge, 2016). In order to measure the relevance effect, the marginal effect of FDI on economic growth was calculated in this study through the use of partial derivatives as follows:

$$\frac{\partial \ln GDP_t}{\partial \ln FDI_t} = \beta_1 + \gamma \ln BE_t \tag{10}$$

Referring to Equation (9), the influence of FDI on economic growth is contingent upon the extent of business environment. In order to validate the significance of its marginal effect, Brambor, Clark, and Golder's (2006) proposed formula of new standard errors was applied in this study to compute the t-statistics for the inferential test. More specifically, the formula of the new standard errors $\left(\widehat{\sigma}\right)$ for the marginal effect of FDI with respect to business environment is written as follows:

$$\widehat{\sigma} = \sqrt{var\left(\widehat{\beta}_1\right) + \ln BE^2 var(\hat{\gamma}) + 2 \ln BE cov\left(\widehat{\beta}_1 \hat{\gamma}\right)} \tag{11}$$

where *var* and *cov* are the variance and covariance of FDI and the interaction term, respectively.

3.2 Sources of Data and the Summary of Descriptive Statistics

This study covered the yearly time series data of China from 1986 to 2020. All data were retrieved from various reputable databases, namely World Development Indicators (WDI) of World Bank, the United Nations Conference on Trade and Development (UNCTAD), National Bureau of Statistics of China, and International Country Risk Guide (ICRG). All variables in this study were converted into natural logarithm in order to standardise the unit of measurement, control heteroskedasticity, and improve stationarity.

More specifically, the dataset for per capita real GDP, population growth, per capita real FDI, and per capita real gross fixed capital formation (total investment) were collected from the WDI database. Furthermore, referring to Tang and Tan (2015), this study constructed the domestic investment variable by subtracting FDI with gross fixed capital formation. Ang (2010) and Tan and Tang (2012) applied the same calculation.

Apart from FDI inflows and economic growth, it was deemed noteworthy to highlight business environment as another important variable accounted in the present study. Referring to past studies on business environment (Worthington and Britton, 2006; Eifert, 2009; Jayasuriya, 2011; Acquah and Ibrahim, 2020), an index for business environment was constructed from four perspectives, namely (1) institutional quality, (2) financial development, (3) infrastructure, and (4) human capital and innovation (see Appendix A). In this study, the entropy weight method was employed to construct the business environment index (Ding *et al*., 2016; Shi and Liu, 2020; Zhu *et al.*, 2023). The entropy weight method is an objective weighting method. The fundamental concept is to determine objective weights based on the variability of the index. In general, when the information entropy of the data is smaller, it indicates a higher degree of variation in the index value. Consequently, it provides more information and plays a more significant role in the comprehensive evaluation, resulting in a higher weight (see Appendix B for more details). Table 1 presents the summary of the descriptive statistics for each variable.

Table 1: Summary of Descriptive Statistics

Variables	Mean	Min.	Max.	Std. Dev.
$\ln GDP_t$	7.878	6.869	9.143	0.827
$\ln FDI_t$	3.977	2.231	4.601	0.791
$\ln DI_t$	2.882	1.75	3.768	0.678
$\ln PG_t$	–2.071	–2.885	–1.690	0.244
$\ln BE_t$	5.296	4.069	6.412	0.726

3.3 Econometric Methods

Pesaran, Shin, and Smith's (2001) proposed bounds test for cointegration was applied in the current study to examine the presence of a long-term equilibrium relationship involving FDI, business environment, and economic growth. This cointegration test was conducted using the autoregressive distributed lag (ARDL) model. Therefore, the bounds test is also known as the ARDL cointegration test.

Unlike the traditional cointegration tests, the bounds test for cointegration has several advantages. Firstly, the bounds test for cointegration is more efficient in a small sample study. Secondly, this test can be applied regardless of whether the explanatory variable(s) is pure *I*(0), pure *I*(1), or a mixed order of integration. Thirdly, the ARDL estimation with appropriate lag length can correct the serial correlation problem in the equation. Therefore, Pesaran, Shin, and Smith (2001) documented that the bounds test has better statistical properties than the traditional cointegration tests.

In order to examine the presence of cointegration using the bounds test, this study estimated the following ARDL model as follows:

$$\begin{aligned}\Delta \ln GDP_t = {} & \alpha_0 + \delta_1 \ln GDP_{t-1} + \delta_2 \ln FDI_{t-1} + \delta_3 \ln FDI_{t-1} + \delta_4 \ln PG_{t-1} \\ & + \delta_5 \ln BE_{t-1} + \sum_{i=1}^{p} \varphi_i \Delta \ln GDP_{t-i} + \sum_{i=0}^{q} \vartheta_i \Delta \ln FDI_{t-i} \\ & + \sum_{i=0}^{s} \phi_i \Delta \ln DI_{t-i} + \sum_{i=0}^{m} \omega_i \Delta \ln PG_{t-i} + \sum_{i=0}^{n} \rho_i \Delta \ln BE_{t-i} + \mu_t\end{aligned} \tag{12}$$

where Δ is the first differenced operator; μ_t is the error term; p, q, s, m, and n represent the optimal lag order determined by the Akaike Information Criterion (AIC).

In order to determine the existence of a cointegrating relationship, this study performed the joint significance F-test on the lagged explanatory variables, namely $\ln GDP_{t-1}$, $\ln FDI_{t-1}$, $\ln DI_{t-1}$, $\ln PG_{t-1}$, and $\ln BE_{t-1}$. The calculated F-statistic exceeding the upper bounds critical value implies that the variables are cointegrated. Otherwise, it would be concluded that the variables are not cointegrated, or a long-term relationship of economic growth, FDI, and business environment in China is unattainable.

4. Empirical Results

This study employed the time series econometric techniques. Specifically, the unit root test was first performed to determine the stationarity of the data. Following that, the cointegration test was performed to determine whether there is a long-term equilibrium relationship involving the variables under study. The presence of cointegrated variables suggests that a meaningful growth model can be estimated for the relationship involving FDI, business environment, and economic growth in China.

4.1 Unit Root and Cointegration Analyses

It is highly important to check the stationarity of data before the time series analysis is carried out. Regression analysis involving non-stationary variables produces spurious estimated results. Therefore, a unit root test was performed on the data prior to any further analysis. In order to ensure the reliability of the results, the existence of a unit root was examined using two different methods, namely the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests.

Table 2: Results of Unit Root Tests

Variables	ADF test	PP test
Level:		
$\ln GDP_t$	–2.395(3)	–3.305(4)
$\ln FDI_t$	–1.717(2)	–1.520(3)
$\ln DI_t$	–2.655(1)	–2.352(1)
$\ln PG_t$	–0.952(2)	–1.767(3)
$\ln BE_t$	–3.327(0)	–3.327(0)

First difference:		
$\Delta \ln GDP_t$	–3.978(0)***	–3.969(3)***
$\Delta \ln FDI_t$	–4.112(1)***	–3.457(3)**
$\Delta \ln DI_t$	–3.084(0)***	–2.977(3)***
$\Delta \ln PG_t$	–3.935(0)***	–3.691(3)***
$\Delta \ln BE_t$	–5.903(1)***	–6.419(3)***

*Note: The asterisks *** and ** denotes statistical significance at the 1 and 5 per cent levels, respectively. The optimal lag order for ADF test is chosen by the AIC, while the bandwidth for PP test is selected with the Newey-West procedure.*

Table 2 presents the results of the unit root tests. Although the variables were non-stationary in level, all variables were found stationary after the first difference was taken. Therefore, it can be concluded that the variables were *I*(1). This study then proceeded to test whether there is a long-term equilibrium relationship involving these variables.

As for the selection of the appropriate lag order for the bounds test with the ARDL model, AIC was employed. Enders (2004) suggested a maximum lag order of three years to capture the system's dynamics for annual data analysis. Consequently, the lowest AIC values suggested ARDL (1, 2, 2, 1, 0) lag order as optimal. Table 3 presents the results of the bounds test for cointegration, along with the critical values for $T = 36$. The calculated F-statistics value was 5.209, which exceeded the 5 per cent upper critical value of 4.630, indicating the presence of cointegration.[1] The obtained results confirmed the presence of a meaningful estimation of a long-run relationship of FDI, business environment, and economic growth in China.

Table 3: Results of Bounds Test for Cointegration

Model	lnGDP=*f* (lnFDI,lnDI,lnPG,lnBE)		
Optimal lag	ARDL (1, 2, 2, 1, 0)		
F-statistics	5.209**		
	Small sample critical values, *T* = 36		
Significance Level	**10 per cent**	**5 per cent**	**1 per cent**
Lower bound, I(0)	2.696	3.276	4.590
Upper bound, I(1)	3.898	4.630	6.368

*Notes: The asterisk ** indicates statistical significance at the 1 per cent level. R-squared: 0.999; F-Statistic: 2914.481 [0.000]; Jarque-Bera: 1.367 [0.505]; Breusch-Godfrey LM: 2.721 [0.257]; ARCH: 2.465 [0.116]; Ramsey RESET: 0.701 [0.491]; [.] refers to the p-values. The small sample critical values are obtained from Narayan (2005).*

4.2 Estimation of a Long-term Relationship

As this study observed the cointegration involving these variables, a long-term relationship was estimated. The ordinary least squares (OLS) estimator was used to perform the estimation as it is regarded as the best linear unbiased estimator (BLUE) with the lowest estimator variance. In addition, the OLS estimator is widely used in the study of time series data because it is an efficient and super-consistent long-run estimator, especially when all variables are $I(1)$ and cointegrated (Stock, 1987).

Table 4 presents this study's long-term estimation results. Model 1 showed the results of regression analysis prior to the introduction of the business environment variable. The results revealed domestic investment and FDI as the main driving factors of China's economic development. Specifically, the results revealed that an increase of 1 per cent in FDI corresponded to an increase of 0.8 per cent in economic growth. Similarly, with other factors held constant, an increase of 1 per cent in domestic investment led to an improvement of 0.86 per cent in economic growth. However, we find that population growth exhibits a negative correlation with the growth of GDP. Several prior studies that were based on the Solow's model of economic growth, such as those by Mankiw *et al.* (1992), Ding and Knight (2009), and Su and Liu (2016), reported similar negative observations.

Model 2 presented the results of regression analysis after the introduction of the business environment variable. The results revealed the positive influence of business environment on economic growth. Specifically, an increment of 1 per cent in the business environment was associated with an increase of 0.034 per cent in economic growth. This particular result was found consistent with the study of Bah and Fang (2015), suggesting that better business environment tends to boost the economic development.

Considering the cointegrating relationship of FDI, business environment, and economic growth, the scope of analysis in this study was expanded to examine the moderating role of business environment in influencing the influence of FDI on economic growth. In particular, the interaction term $\left(\ln \mathrm{FDI}_t \times \ln \mathrm{BE}_t\right)$ was included in the analysis. Referring to the results of Model 3, the interaction term between the business environment and FDI was found to be statistically significant and positively related to economic growth at the 99 per cent confidence level. This particular result highlighted the crucial role of the business environment in enhancing the contributions of FDI to economic growth.

Table 4: The Estimated Results of Long-run Relationship

Variables	Model 1	Model 2	Model 3
Constant	1.938***	1.732***	1.725***
	(0.000)	(0.000)	(0.000)
Domestic Investment, $\ln DI_t$	0.860***	0.829***	0.776***
	(0.000)	(0.000)	(0.000)
Population Growth, $\ln PG_t$	–0.133***	–0.239***	–0.250***
	(0.000)	(0.000)	(0.000)
Foreign Direct Investment, $\ln FDI_t$	0.800***	0.774***	0.726***
	(0.000)	(0.000)	(0.000)
Business Environment, $\ln BE_t$		0.034*	0.095***
		(0.088)	(0.002)
$\left(\ln FDI_t \times \ln BE_t\right)$			0.130***
			(0.007)
Marginal effects: $\partial \ln GDP / \partial \ln FDI$			
$\beta_1 + \gamma BE_{MIN}$			1.254***
			[0.161]
$\beta_1 + \gamma BE_{MEAN}$			1.413***
			[0.215]
$\beta_1 + \gamma BE_{MAX}$			1.558***
			[0.264]
Diagnostic tests:			
R^2	0.998	0.998	0.999
Adjusted-R^2	0.998	0.998	0.999
F-statistics	3419.956 ***	3864.531***	5068.135***
	(0.000)	(0.000)	(0.000)
χ^2_{NORMAL}	0.963	0.254	0.331
	(0.618)	(0.881)	(0.847)
χ^2_{AUTO}	4.083	1.489	1.051
	(0.130)	(0.475)	(0.591)
χ^2_{ARCH}	0.216	0.059	0.057
	(0.643)	(0.808)	(0.812)
χ^2_{RESET}	0.010	1.650	0.712
	(0.992)	(0.111)	(0.483)

*Note: The asterisks *** and * indicate statistically significant at the 1 per cent and 10 per cent levels, respectively. Figures in the parenthesis (.) are the p-values. [.] represents the corrected standard errors for marginal effects suggested in Brambor et al. (2006).*

However, according to Wooldridge (2016), if an interaction term is found to be statistically significant, it is challenging to conduct a direct interpretation of the estimated coefficients, particularly in this case, for FDI and business environment, as their influence on economic growth now would depend on the combined influence. In light of this, the marginal

effect of FDI on economic growth was calculated under the influence of the business environment. In order to ensure robustness of the results, the standard errors for the marginal effect were computed according to the formula recommended by Brambor *et al*. (2006). The obtained results are included in Table 4.

Overall, the marginal effect of FDI on economic growth was found to be statistically significant and positive at the 1 per cent level. The influence of FDI on economic growth was deemed valid across various levels of business environment, at the minimum, mean, or maximum level. More specifically, this study ascertained the increase of the marginal effect of FDI with business environment, ranging from 1.254 per cent to 1.558 per cent. With that, the obtained results and findings of the current study highlighted that the improvement of the business environment in China not only promotes economic growth but also enhances the contributions of FDI in sustaining the country's long-term economic growth.

This finding is consistent with the perception of enterprises in the context of China's business environment optimisation. A favourable investment environment, efficient administrative services, and a well-developed infrastructure and social service system are conducive to attracting FDI (Wang and Hu, 2023). Moreover, Kwak *et al.* (2019) added that the prosperity and development of e-commerce, such as Alibaba in China is also closely attributed to the improvement of infrastructure, the construction of systems and regulations, and the development of technology management.

In a practical setting, the favourable business environment in China has successfully attracted the American biotech company, Moderna. On 5th July 2023, they endorsed a strategic cooperation agreement with the Shanghai Municipal Commission of Economy and Information and the Minhang District Government. This agreement signifies an estimated investment project of approximately US$507 million in China (Xinhua, 2023). To facilitate this investment, the administrative approval process was streamlined, high-quality services were provided to enterprises, and a factory was constructed in Shanghai within a span of three months.

A recent report by China Daily (2024) highlighted that the President of Fresenius Kabi MedTech, a medical device manufacturer based in Germany, has agreed to increase their investment and production in China. This decision was influenced by the robust growth of the Chinese market and the investor-friendly business environment. Clearly, the conducive

business environment in China, characterised by excellent infrastructure, efficient systems, and a wealth of talent and innovation, has created ample opportunities for FDI. This has not only facilitated the development of foreign businesses but also yielded substantial economic benefits. As such, it is reasonable to conclude that optimising the business environment promotes both domestic and foreign enterprises, which in turn drives economic growth in China.

5. Conclusion and Policy Implications

Although the relationship between FDI and economic growth has been explored in numerous studies, the obtained empirical findings have yet to yield a unified conclusion. In addition, the proposition of optimising business environment policies in China offers a fresh research perspective. Therefore, the current study selected China as a sample to examine the relationship of business environment, FDI, and economic growth using time series data spanning from 1986 to 2020.

The empirical results of this study showed the significant and positive influence of FDI on China's economic growth. The results further identified business environment as an important factor in promoting long-term economic growth. At the same time, this study observed the positive moderating effect of the business environment on the relationship between FDI and economic growth. In other words, a more favourable business environment in China amplifies the positive influence of FDI on economic growth. In light of this, maintaining a conducive business environment is vitally important in attracting foreign capital inflows and, in turn, propelling long-term economic growth.

Based on these findings, this study recommended policymakers to maintain their focus on enhancing the business environment to effectively promote long-term economic growth. Given that institutional quality, infrastructure, financial development, and human capital and innovation are the four major pillars of the business environment, policymakers should strive to improve these pillars to provide a conducive environment for businesses in China. As such, the Chinese government should prioritise uplifting institutional quality, such as encouraging government effectiveness, ensuring a stable political environment, and combating corruption. In addition, there is a need to continually reinforce infrastructure, including a reliable transportation system, robust electricity supply, and advanced

information and communications technology (ICT). Moreover, attention should be directed to refining the financial sector, especially channelling financial resources to small and medium-sized enterprises (SMEs).

Besides that, in order to provide the necessary skills and talented labour to support the influx of FDI, the Chinese government's fiscal budget should prioritise an increased allocation for education, English language proficiency, and scientific research. This can help nurture innovative talents, foster development through education, and drive industrial structural adjustment by enhancing human quality and innovation capabilities. The emphasis should be placed on strengthening international scientific research cooperation to attract high-quality foreign investment. This includes a focus on encouraging high-end foreign investment through collaboration and cooperation in scientific endeavours.

Note

[1] To ensure robustness, the present study also conducted the Johansen (2002) multivariate cointegration test with Bartlett correction for small samples. Consistent with the results of the bounds testing approach to cointegration, the findings of Johansen's cointegration test also provide evidence of cointegration. This confirms that our findings are robust and reliable. To conserve space, the full results are not reported here but are available upon request from the corresponding author.

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Appendix A: Dimension of Business Environment

Indicators	Sources
Institutional Quality:	
Political Stability	ICRG
Corruption	ICRG
Government Effectiveness	ICRG
Rule of Law	ICRG
Voice and Accountability	ICRG
Regulatory Quality	ICRG
Financial Development:	
Share of Deposit to Financial Institution to GDP	CNBS
Share of Broad Money Supply M2 to GDP	WDI
Share of Domestic Credit to Private Sector to GDP	WDI
Share of Stock Market Capitalisation to GDP	CNBS
Infrastructure:	
Railway Operating Mileage (10,000 km)	CNBS
Road Mileage (10,000 km)	CNBS
Telephone Penetration (including mobile phones) (100 people)	WDI
Electricity Consumption (kWh per capita)	WDI
Human Capital and Innovation:	
Number of University Graduates (million)	CNBS
Research and Development Expenditure (billion yuan) to GDP	CNBS
Technology Market Turnover (100 million yuan) to GDP	CNBS
Patent Applications by Residents	CNBS

Note: ICRG = International Country Risk Guide, WDI = World Development Indicators, and CNBS = National Bureau of Statistics of China.

Appendix B: Supplementary Materials for Entropy Weight Method

Explanation	Formula Expression
Construct an Evaluation Matrix X.	
Assume an evaluation matrix composed of m evaluation objects and n indicators. where x_{ij} is the evaluation value of the *j-t*h evaluation item under the *i-t*h evaluation index.	$X=[x_{ij}]_{mn}$
Standardise the Data.	
To eliminate the impact of the dimensional differences of different data indicators and ensure the reliability of the results, using the range method to standardise the index values so that they are between [0~1].	For beneficial response indicators: $x_{ij}^{'}=\frac{x_{ij}-min(x_{ij})}{max(x_{ij})-min(x_{ij})}$ For non-beneficial reaction indicators: $x_{ij}^{'}=\frac{max(x_{ij})-x_{ij}}{max(x_{ij})-min(x_{ij})}$
Calculate Proportion.	
Based on the standardised data obtained above, calculate the proportion of the secondary indicators: Since there are indicators with a value of 0 after standardisation, for the convenience of calculation, all data are shifted by adding 0.1.	$P_{ij}=\frac{x_{ij}^{'}}{\sum_{i=1}^{m}x_{ij}^{'}}$
Calculate the Index Information Entropy Value.	
e_j is the information entropy value of the *j-t*h index. The greater the entropy value e_j of an index, the smaller its role in the comprehensive evaluation and the smaller its weight; otherwise, the greater its weight. where, $k=\frac{1}{lnm}$, P_{ij} is the proportion of the index in the *i-t*h year under the *j-t*h index.	$e_j=-k\left[\sum_{i=1}^{n}P_{ij}\,ln(P_{ij})\right]$
Calculate the divergence of indicator *j*.	$d_j=1-e_j$
Determine the Entropy Weight of the Evaluation Index.	$w_j=\frac{d_j}{\sum_{j=1}^{n}d_j}$
Calculate the Composite Score Index.	$U_i=\sum_{j=1}^{n}x_{ij}^{'}\times w_j$