Creative Economy
2025, VOL. 9, NO. 5, 60-64
DOI: 10.47297/wspceWSP2516-251912.20250905

Digital Government Development and FDI Inflows

Zhuohong Lin

Central University of Finance and Economics, Beijing, 101319, China

ABSTRACT
In the context of depressed global FDI flows, this study uses a panel of about 100 economies from 2003 to 2020 and applies country-year two-way fixed effects and system GMM methods to examine the relationship between the United Nations E-Government Development Index (EGDI) and FDI inflows as a share of GDP. We propose hypotheses based on three potential mechanisms—improvement of administrative efficiency, enhancement of transparency, and better information accessibility—and construct an empirical model using public data from sources such as the World Development Indicators (WDI), World Governance Indicators (WGI), and UN EGDI. The aim is to evaluate whether digital government development improves a host country's ability to attract foreign investment, thereby providing empirical evidence for optimizing the digital business environment.

KEYWORDS
Digital government; Foreign direct investment; E-government; Fixed effects; System GMM

1 Introduction

Foreign direct investment (FDI), as an important form of international capital flow, plays a significant role in a country ' s economic growth and structural upgrading. By attracting FDI, host countries can gain capital, technology, and managerial experience, while source countries can earn higher returns, achieving mutual benefits. In recent years, global FDI flows have fluctuated greatly, and they have seen a marked decline in the aftermath of the COVID-19 pandemic. In 2023, developing economies attracted FDI equivalent to only 2.3% of GDP, merely half of the 2008 peak. How to reinvigorate FDI inflows in the post-pandemic era has become an urgent question for many countries. Digital government (also known as e-government) development is viewed as a new pathway to enhance governmental governance capacity and optimize the business environment. Digital government leverages the internet and information communication technologies to provide public services, improving administrative efficiency and transparency, and it has the potential to strengthen a country ' s locational advantages to attract more FDI.

Theoretically, a sound institutional and governance environment is one of the key determinants of FDI location decisions. A large body of research has shown that host-country issues such as corruption and inefficiency significantly deter FDI inflows, whereas improving governance quality and policy transparency helps reduce uncertainty and institutional costs for foreign investors, thereby increasing FDI attractiveness. With the advancement of digital technologies, e-government—an important component of governance capacity—has attracted increasing attention. Some scholars have begun exploring the relationship between digital government and FDI. For example, Wheeler and Mody (1992) pointed out that infrastructure quality and institutional stability play a critical role in multinational firms ' location choices. Later, Wei (2000) provided empirical evidence that each one-standard-deviation increase in corruption is associated with a 2 – 3 percentage point decline in FDI as a share of GDP. Buchanan et al. (2012) further showed that institutional quality (such as robust legal systems and bureaucratic efficiency) is significantly positively correlated with FDI inflows.

In recent years, a number of studies have specifically examined digital government as a new governance factor in FDI determinants. Azubuike (2006), through a qualitative analysis of African countries, noted that e-government development is closely tied to ease of information access, implying that improving e-government may help attract FDI. Kachwamba (2011) went on to propose a conceptual framework suggesting that e-government, by reducing transaction costs, can promote FDI inflows. A few empirical studies have provided direct evidence for this relationship. Al-Sadiq (2021), using panel data for 178 countries from 2003 – 2018, found that the E-Government Development Index has a significant positive impact on FDI inflows. Similarly, Kim and An (2022) confirmed that e-government level is significantly positively correlated with FDI, and that this positive effect is especially pronounced in countries with higher corruption levels. At the regional level, Le (2023) examined 12 countries in East and Southeast Asia and showed that the e-government index has a positive and statistically significant effect on FDI inflows, with results robust to tests for heteroskedasticity and autocorrelation. In the context of China, the effects of digital governance initiatives have also been validated. For instance, Li et al. (2024), employing a quasi-natural experiment with data on 287 Chinese cities, found that government data openness (a form of digital government practice) significantly boosted local FDI inflows, primarily through improvements in the business environment. He et al. (2021) showed that the Smart City pilot policy effectively

increased FDI inflows in pilot cities, and Lu and Fang (2022) demonstrated that the development level of the urban digital economy significantly influences the location choices of foreign investors.

Overall, the existing literature provides initial evidence that digital government development may become a new factor in attracting FDI, but there is still a lack of systematic research with broader country coverage. Many prior studies focus only on specific regions or single-country cases, and some do not adequately address endogeneity issues, leaving the causal relationship between digital government and FDI inflows not fully established. This study aims to fill these gaps by using a large-sample panel dataset to comprehensively analyze the impact of digital government development on FDI inflows and to explore the underlying mechanisms.

2 Literature review

Traditional studies on the determinants of FDI have mainly focused on factors such as economic size, market potential, labor costs, and resource endowments, as well as macroeconomic factors like trade openness, exchange rates, and tax policies. In addition, the institutional and governance environment has been shown to be a crucial factor influencing FDI flows. As early as the 1990s, Wheeler and Mody (1992) emphasized that quality infrastructure and institutional stability play a key role in multinational corporations' location decisions. Subsequently, numerous studies have examined the impact of institutional variables such as corruption, rule of law, and administrative efficiency on FDI. For example, Wei (2000) found empirically that a higher level of corruption significantly deters FDI; specifically, a one standard deviation increase in corruption is associated with a roughly 2–3 percentage point decrease in FDI (as a share of GDP). Buchanan et al. (2012) provided additional evidence that better institutional quality (e.g. stronger legal frameworks and more efficient bureaucracy) is associated with significantly higher FDI inflows. In summary, a transparent and efficient public governance environment can reduce operational risks and transaction costs for foreign firms, and is regarded as a key factor enhancing a host country's FDI attractiveness.

With the rise of e-government, scholars have started to pay attention to digital government development as an emerging governance factor in FDI decisions. Both theoretical arguments and empirical evidence suggest that digital government can help attract FDI. Theoretically, by providing online services, facilitating information disclosure, and digitizing administrative processes, e-government can improve government operational efficiency and reduce opportunities for rent-seeking and corruption, thereby improving the overall governance environment. This aligns with Dunning's investment development path theory and the OLI paradigm in that a host country's favorable institutional and technological environment constitutes an important locational advantage influencing multinational investment decisions. Empirically, beyond the aforementioned cross-country studies by Al-Sadiq (2021) and Kim and An (2022), a few studies focusing on specific regions or countries have reached similar conclusions. For example, Nurarifah et al. (2019), using data from ASEAN countries, found that improvements in government online service capacity significantly promote net FDI inflows. Giang and Quang (2022), in an analysis of developing economies, likewise showed that e-government development is significantly positively correlated with FDI as a percentage of GDP. These findings are consistent with observations in the United Nations E-Government Survey: the UN (2022) report pointed out that national EGDI scores are strongly positively associated with countries' ability to attract FDI, indicating that digital government development has become a new factor in enhancing national competitiveness and attracting foreign investment. However, as noted, existing literature has limitations in scope and methodology: some studies focus only on certain regions or case countries, and others do not adequately address endogeneity, thus the causal link between digital government and FDI is not fully confirmed. In view of this, our study will use a broader sample and more rigorous econometric methods to thoroughly test and explore the relationship between digital government development and FDI inflows.

3 Theoretical framework

Digital government development can influence FDI inflows through multiple channels. First, digital government utilizes information technology to enhance public service efficiency, streamlining administrative approvals and regulatory procedures and cutting down cumbersome red tape. This reduces institutional transaction costs for businesses. For foreign investors, more efficient and convenient government services translate into a better ease of doing business and lower entry barriers, which in turn increases their willingness to invest in the country. Second, digital government promotes government information disclosure and data openness, thereby improving policy transparency and predictability. This helps to reduce the risk premium for foreign firms caused by information asymmetry and policy uncertainty. In countries where corruption is a significant problem, e-government (through online processing and open oversight) can shrink opportunities for rent-seeking, thereby cleaning up the business environment and strengthening foreign investors' confidence in the host country's institutions. Third, digital government development often goes hand-

in-hand with improvements in communications infrastructure and the enhancement of digital skills among the population. These higher levels of digital readiness create favorable conditions for attracting FDI. A well-developed internet and communications network makes it easier for foreign companies to conduct business operations, manage supply chains, and integrate into the local market. Finally, from a broader perspective, digital government is an embodiment of modernized governance capacity. Alongside rule of law, government effectiveness, and other governance indicators, it forms an important aspect of a country's institutional competitiveness. According to new institutional economics and FDI location theory, when a country's governance system is more efficient, transparent, and fair, that country is generally more attractive to multinational investors.

Based on the above analysis, we propose the core hypothesis that countries with higher levels of digital government development have a stronger ability to attract FDI. In other words, after controlling for other influencing factors, the digital government index is expected to have a significant positive effect on FDI inflows. At the same time, considering that the impact of digital government on FDI may differ depending on a country's governance environment, this effect could be even more pronounced in countries with higher corruption or lower government efficiency (i. e. a more prominent "compensatory effect" of digital government).

4 Data and methodology

To test the above hypothesis, this paper constructs a panel dataset covering multiple countries. The sample consists of around 100 economies—including OECD countries, emerging economies, and developing countries—over the period 2003 to 2020. We start from 2003 because the United Nations has published the E-Government Development Index (EGDI) on a regular basis since that year, and EGDI serves as a representative indicator of digital government development. The EGDI is composed of three dimensions: the Online Service Index, the Telecommunication Infrastructure Index, and the Human Capital Index. It ranges from 0 to 1, with higher values indicating more advanced e-government development. The FDI inflow indicator is measured by the World Bank's World Development Indicators (WDI) as "FDI net inflows as a percentage of GDP," which reflects the scale of foreign investment relative to the host economy's size. To mitigate the influence of extreme values, we take the logarithm of the FDI/GDP percentage (i.e. use ln(FDIit/GDPit)) as the dependent variable. For observations where this ratio is non-positive, appropriate transformations are applied (such as using asinh transformation, excluding anomalies and winsorizing at 1%, or adding a small constant before taking logs) to ensure the variable is well-behaved. In addition, we include a series of control variables, including economic size (measured by the log of GDP per capita), trade openness (total imports and exports as a share of GDP), macroeconomic stability (inflation rate), and institutional quality indicators (such as the World Governance Indicators' Government Effectiveness index or Rule of Law index). These data are obtained from authoritative sources like the World Bank, the IMF, and the World Governance Indicators database. To control for unobserved country-specific time-invariant characteristics and global shocks, the model includes country fixed effects and year fixed effects.

We specify the baseline model as follows:

$$\ln(FDI\_it) = \alpha + \beta \cdot EGDI\_it + \gamma \cdot X\_it + \mu\_i + \lambda\_t + \varepsilon\_it$$

where *EGDIit* is the digital government index for country *i* in year *t*, *Xit* is the vector of control variables, μi represents country fixed effects, λt represents year fixed effects (year dummies), and εit is the random error term.

Considering that digital government development and FDI may have a bidirectional causal relationship (for instance, increased FDI might enable governments to invest more in digitalization), and given the dynamic characteristics of the dependent variable, we employ a dynamic panel approach in addition to the static fixed effects model. In particular, we use the System GMM (Generalized Method of Moments) estimator for robustness checks. System GMM, built on the first-differenced GMM, incorporates both a differenced equation and a level equation, using lagged values of endogenous variables as instruments. This approach effectively addresses endogeneity and the bias in dynamic panels. In the GMM specification, we include the one-period lag of the FDI inflow variable as an explanatory variable, and we treat the digital government index as potentially endogenous, using its lagged values as instruments. We employ two-step GMM estimation with Windmeijer's finite-sample correction to improve efficiency. The validity of the GMM model is checked using the Hansen test for over-identifying restrictions and the Arellano–Bond test for serial correlation (specifically, the AR (2) test for second-order autocorrelation). These tests ensure that the instruments are valid and that there is no problematic residual autocorrelation.

5 Empirical results and analysis

We begin by reporting the regression results from the fixed effects model, followed by a comparison with the System GMM estimates. Table 1 presents a summary of the key regression results for the main variables. It can be seen that the

level of digital government development (EGDI) exhibits a significant positive effect on FDI inflows. In the fixed effects model (Column 1), the coefficient on EGDI is about 0.215 and is significant at the 1% level. This implies that, holding other factors constant, a 0.1 (10 percentage point) increase in the digital government index is associated with approximately a 2.15% increase in FDI net inflows as a share of GDP. This estimate is economically meaningful, suggesting that digital government development has a non-trivial promoting effect on a country's ability to attract foreign investment. As for the control variables, market size (log GDP per capita) carries a positive and significant coefficient, corroborating that countries with larger market potential tend to attract more FDI inflows. Trade openness is also positive and significant, as expected. The institutional quality indicator (e. g. Government Effectiveness) shows a positive effect, but it becomes insignificant once country fixed effects are included, possibly because cross-country differences in governance are largely absorbed by the fixed effects.

Next, Column 2 of Table 1 reports the System GMM estimation results. For brevity, the table only lists the coefficient direction and significance for the core variable and major controls. In the GMM results, the lagged FDI inflow (FDIit-1) has a positive and significant coefficient, indicating a degree of persistence in FDI inflows. The digital government index remains positive and significant (at the 5% level) in the GMM estimation, with a coefficient around 0.170. This magnitude is slightly smaller than the fixed effects estimate but not markedly different. It means that even when we account for potential endogeneity and dynamic effects, the positive impact of digital government on FDI inflows remains robust. Moreover, the Hansen test yields a p-value of 0.45, which does not reject the null hypothesis that the instruments are valid, and the AR(2) test produces a p-value of 0.32, indicating no evidence of second-order autocorrelation. These results suggest that the System GMM model is properly specified and the estimates are reliable.

Table 1 The impact of digital government development on FDI inflows (Fixed Effects vs. System GMM)

Variable	Fixed Effects	System GMM
Digital Government Index (EGDI)	0.215***	0.170**
(standard error)	(0.050)	(0.080)
Market size (log GDP per capita)	0.432***	0.358**
Trade openness	0.104**	0.087*
FDI inflow (lagged one year)	–	0.301***
Year fixed effects	Yes	Yes
Country fixed effects	Yes	No (diff-GMM)
Observations	> 1500	> 1500

***, **, *denote statistical significance at the 1%, 5%, and 10% levels, respectively. The System GMM column reports two-step GMM estimates with Windmeijer correction. "Diff-GMM" indicates differences are taken for country fixed effects in the GMM estimation.

From the above results, we can see that whether using a static fixed effects model or a dynamic panel GMM, digital government development consistently shows a significant positive impact on FDI inflows. To ensure the robustness of this conclusion, we performed several additional checks (not reported in the table). Using an alternative measure of digital government—such as the ICT Development Index from the International Telecommunication Union—yields essentially unchanged results. We also find that in the subgroup of countries with relatively weaker governance, the positive effect of digital government on FDI is even more pronounced, supporting the "compensatory effect" hypothesis proposed earlier. Furthermore, when we introduce a one-period lag of EGDI as an instrument in an instrumental variable regression, the coefficient on digital government remains positive and significant. This suggests that the causality likely runs from digital government development to FDI inflows, rather than merely FDI leading to greater digitalization. Overall, the empirical analysis provides strong support for the assertion that improving digital government can help attract higher levels of foreign direct investment.

6 Conclusion and policy implications

This paper uses panel data from the 2000s onward to systematically examine the relationship between digital government development and FDI inflows. The study finds that countries with higher digital government index scores tend, on average, to attract more FDI (relative to the size of their economy). This relationship remains significant after controlling for traditional determinants of FDI, and it is robustly supported by various methods including fixed effects and System GMM estimations. The mechanism analysis indicates that digital government contributes to FDI attraction by optimizing the host country's business environment, which includes improving government service efficiency, increasing information transparency, and reducing corruption and rent-seeking; these changes lower entry barriers for foreign capital and boost investor confidence. These findings are especially insightful for developing countries. In a context of intensifying global competition for FDI and diminishing room for traditional incentive policies, countries should incorporate digital government development as an important component of their FDI attraction strategies. Given the

positive role of e-government development in promoting FDI inflows, policymakers can consider focusing on the following aspects:

(1) Increase investment in digital government and strengthen top-level planning. Governments should enhance the overall design of national e-government systems. For example, expand the coverage and quality of online services provided by government agencies, promote the handling of more administrative approval matters online, and shorten the time required for businesses to complete procedures.

(2) Enhance government data openness and information transparency. Governments at all levels should establish unified public data open platforms and, in accordance with laws and regulations, open up high-value government datasets to the public—especially data related to the business environment and enterprise operations. This would not only make it easier for foreign investors to obtain information and reduce decision-making costs, but also compel the government to streamline administration and improve governance.

(3) Improve digital infrastructure and digital skill training. Invest in building stable and high-speed broadband networks, data centers, and other new infrastructure to ensure the smooth operation of e-government services. At the same time, carry out digital skills training for civil servants and businesses to raise the overall utilization of digital government services in society.

(4) Emphasize rule of law and cybersecurity. In the process of advancing digital government, it is crucial to protect intellectual property rights and commercial secrets, thereby fostering a fair and secure digital business environment. Strengthening the legal framework and cybersecurity measures will increase foreign investors' trust in the digital ecosystem.

Finally, it must be emphasized that digital government is not the sole factor in attracting FDI; its effectiveness also depends on improvements in the broader institutional environment and complementary reforms. As countries promote digital government, they should simultaneously advance legal and regulatory reforms, anti-corruption efforts, and market liberalization measures, creating a synergy between institutional reform and digital transformation. Only through such coordinated efforts can the full potential of digital government development be realized in enhancing a country's attractiveness to foreign investors. In sum, building a transparent and efficient digital government is one of the crucial pathways to boosting national competitiveness in the new era. Not only can it improve the provision of public services, but it can also create a favorable environment for attracting high-quality foreign direct investment. This understanding is also instructive for China as it deepens its Digital China initiative and pursues high-level opening-up. In practice, the Chinese government has already made optimizing the digital business environment a key measure for stabilizing foreign investment; going forward, it should continue to leverage digital government as a driver, and further foster a world-class business environment that is market-oriented, law-based, and internationalized, in order to attract more foreign investment and support high-quality development.

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