


E-Government and Foreign Direct Investment: Evidence From Chinese Cities

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ABSTRACT

Along with the rapid development of digital information technology, e-government is of great potential because it is a new form of conducting public administration and a way of demonstrating governmental innovation. The literature suggests that foreign direct investment (FDI) is increasingly associated with the continuing development of e-government in China. Using the Annual Census of Industrial Enterprises and e-government scores of government portals, this study examines the effects of e-government on FDI and how government subsidies mediate relationships between e-government and FDI. The results show that e-government positively affects FDI, and government subsidies have a positive effect on foreign enterprises' investment efficiency by playing a mediating role between e-government efficiency and FDI. The findings make both theoretical and practical implications related to the role, provision, and acquisition of government subsidies; e-government systems and FDI; e-government scores and government efficiency; and firms maintaining focus on areas that are government priorities.

KEYWORDS

China, Crowdsourcing, E-Government, Economic Growth, Foreign Direct Investment, Government Information, Government Subsidy, Governmental Efficiency

INTRODUCTION

Foreign direct investment (FDI) plays a key role in driving economic growth (Logun, 2020; Zhang, 2001). When multinational enterprises (MNEs) choose where to invest, one of the key factors they consider is the market environment, which crucially depends on government efficiency (Ellis et al., 2017). Due to the complexity of economic management, as well as checks-and-balances built into modern governments, the power and functions of authorities are commonly dispersed among various agencies, which often have varying locations, procedures, criteria, and agendas. This means that

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MNEs need to navigate diverse bureaucratic procedures and multiple relationships in interactions with multiple agencies. Approvals from various agencies may not occur sequentially but in parallel. For example, when a government promises to provide subsidies to high-tech firms through its sci-tech agency, the sci-tech agency first determines whether the applicant firms meet the criteria of 'high-tech enterprises'. Meanwhile the registry agency requires each firm to obtain high-tech status from the sci-tech agency before processing can commence. Given such bureaucratic inconsistencies or difficulties, approval processes that depend on multiple agencies can be protracted and provide government officials with more opportunities to pursue rent-seeking activities. As a result, firms face higher costs, and also lose confidence in the governments with whom they are dealing.

In this era of the digital economy, e-government, where government functions are moved online, can alleviate these challenges. Ideally, e-government can coordinate and streamline the procedures previously carried out by multiple agencies. In other words, e-government transfers one-to-many interactions into one-to-one interactions. In so doing, the firm faces only one e-government portal. This digital pattern can be viewed as a new type of crowdsourcing with the advantages of being flexible, cheap, fast, convenient, transparent, fair, and cost-effective (Huang & Bwoma, 2003; Luna-Reyes et al., 2012; Noor et al., 2011; Tung & Rieck 2005; Wang & Liao 2008; Wescott, 2004). Depending on circumstances, a task, problem, or project can be solved and completed by dealing with a group of agents simultaneously (Logun, 2020; Zhang, 2001). Facilitated by e-government, firms can access information more quickly, interact with government at lower cost, and face less uncertainty, thereby enhancing government accountability and reduce opportunities for potentially corrupt activities (Krishnan, Teo & Lim, 2013).

In the infancy stages of development, studies focused on relationships with citizens. E-government enables citizens to participate in public management by making government data accessible and providing online communication channels (Yang et al., 2019; Dong et al., 2020). This process increases transparency (Kassen, 2017), lowers discretionary power, and reduces corruption (Bhuiyan, 2011; Krishnan & Teo, 2012; Nistor & Adela, 2014). By so doing, e-government increases citizens' confidence in their governments (Picazo-Vela et al., 2012), and improves the governmental decision-making process (Lazaroiu, 2015). Also, existing research discusses the effects of government subsidies from various perspectives, such as operational efficiency (Dube, 2003; Kebede, 2006), production capacity (Cotti & Skidmore, 2010), research and development activities (Cantner et al., 2019; Liu & Shieh, 2005; Gorg & Strobl, 2006), employment (Girma et al., 2008), and export competitiveness (Desai & Hines, 2008). In emerging economies, such as China, subsidies are widely used by local governments to promote industry advancement and economic growth (Chen et al., 2008). In addition, a number of existing studies have investigated the effect of FDI on economic growth (Kyuntae & Hokyung, 2008; Wu & Chen, 2016). For example, Wu and Chen (2016) demonstrated the positive impact of FDI on urbanization. In coastal regions of China, MNEs invest heavily in labour-intensive manufacturing and service industries by taking advantage of relatively low labour costs. Kyuntae and Hokyung (2008) concluded that FDI plays a key role in achieving strong economic growth in both the short and long terms, demonstrating a significant bidirectional relationship between FDI and economic growth in Ireland.

In association with recent political strategies, such as the Belt and Road Initiative, the Chinese government has paid increased attention to globalization (Shao et al., 2020). It encourages domestic firms to invest overseas and attracts foreign firms to invest in China. While subsidies are common, their application and distribution vary in different political regimes (Xu & Xu, 2013); as China is diversified, different regions have different environments contingent upon the subsidy funding and e-government. Because of the special situation in the Chinese transitional economy, where state-owned and private enterprises have coexisted in the market for a long period of time, it is often described as a mixed market (Wu, 2017). This paper contributes to knowledge of government subsidies by providing empirical evidence from the Chinese mixed market.

Despite the previous valuable studies of e-government in China, none were found to have systematically explored the content of e-government functions and foreign investment subsidies, or the relationship between subsidy acquisition and foreign investment. This research fills that gap by investigating a sample of foreign investments made by manufacturing firms in China. Our study found that broad e-government facilitates subsidy acquisitions by MNEs; as a form of public sector crowdsourcing, e-governance, e-knowledge, and e-service functions improve government efficiency and thus facilitate MNEs' investments; subsidy can attract more foreign investment. The rest of the paper is organized as follows: we review the literature and describe hypothesis development, then present research methodology with detailed descriptions of data. Further, we explain data analyses, followed by discussion of theoretical contributions and practical implications as well as limitations and future research possibilities, leading to the final conclusions.

LITERATURE REVIEW AND HYPOTHESES

Existing literature demonstrates that FDI plays a vital role in promoting economic growth in emerging economies (Logun, 2020; Zhang, 2001). In the era of globalization, capital flows quickly and easily around the world, and countries and regions are competing for foreign investment (Cui et al., 2020). When an MNE considers where to invest, it weighs up the size of the market and opportunities (Kinda, 2010), accessibility to supply chains (Bagchi et al., 2014; Shao et al, 2021), the quality of infrastructure (Sanfilippo, 2010) and the business environment (Cui et al., 2020; Shen & Puig, 2018).

Governments around the world are embracing electronic democracy. National and local governments are all switching to online, whether in developed or emerging countries (Improvement & Growth Agency [IdeA], 2002). The World Bank e-government website includes the following definition of the term: e-government refers to the use of information technology by government departments (Wide Area Networks, the Internet, and mobile computing) that are capable of changing interactions with citizen, business, and other branches of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions. In a number of countries, governments directly participate in business, either in the form of state-owned firms or as major buyers of goods and services produced by private sector firms (Cui et al., 2020; Wu et al., 2014). Also, governments can affect the business environment by supervising, managing, and implementing policy supporting the economy (Linders, 2012). For example, firms need to be issued with licenses before they can conduct certain businesses; they can also be penalized for violating rules. In addition, firms are entitled to certain subsidies. Interaction with government is therefore an unavoidable aspect of business operations.

Interacting with governments is often not easy, largely because firms often need to interact with multiple agencies simultaneously. Commonly, a single approval to operate entails input from a variety of government agencies. The nature of this one-to-many interaction generates many difficulties for firms, especially MNEs, due to several reasons. First, the dispersed locations of government agencies make personal contact physically difficult, and it is time consuming to make appointments with relevant officials; additionally, if firms fail to submit perfectly prepared paperwork, further visits can become necessary (Carrigan, 2017). Second, a multiplicity of government agencies makes approval procedures complicated or even mutually contradictory. Before granting approval relating to a single issue, one agency may depend on the approval of another agency. This chain of approvals becomes more complex when more agencies are involved (e.g., Bils, 2019). A worst-case scenario can arise when two agencies' approvals are conditional on each other. Reducing the complexity of approval procedures requires higher-level governmental coordination, which is hard to access in many countries. Third, the complexity of approval procedures handicaps government accountability and can encourage corruption (e.g., Krishnan et al., 2013). When one approval depends on joint approvals from various

agencies, the officials in each agency possess a certain level of veto power and lack of accountability for a specific issue can turn into finger pointing between agencies. With reduced accountability and less stringent internal supervision, government officials may pursue rent-seeking activities when processing firms' applications for licenses or approvals; this inevitably increases firms' costs and damages trust in governments (Boffa et al., 2016).

An e-government option can greatly improve efficiency and facilitate interaction between firms and governments. E-government refers to Internet-based platforms, in which various government agencies' information and functions are integrated (Twizeyimana & Andersson, 2019). Through e-government, approval procedures become more transparent, making it possible to coordinate and streamline procedures. Firms' applications and supporting documents can be easily submitted electronically and shared among relevant agencies (Papadomichelaki & Mentzas, 2009). A decision made by one agency can also be instantly transmitted to the next agency along a pre-defined, and arguably more efficient, approval chain. Furthermore, e-government also enhances accountability (Krishnan & Teo, 2012). Knowing that their actions are recorded in the e-government system, officials will be less likely to delay approvals or conduct rent-seeking activities.

Apart from the benefits mentioned above, e-government makes it much easier for firms to keep updated with changes in government policies, ascertain current requirements, and make themselves aware of what governments can offer (Zhao et al., 2012). Because their interactions with governments are more transparent, firms will have a better knowledge of the progress of their applications and what they can expect. In summary, e-government increases efficiency, and lets government present a friendlier, more open, face to firms. Given these benefits, firms, especially MNEs will, everything else being equal, be more likely to invest in regions with better e-government platforms. Thus, this paper proposes:

H1: The presence and implementation of e-government increases FDI made by MNEs.

To make this argument of more practical relevance, we explore one mechanism through which e-government enhances government efficiency. Different from advanced economies, governments in emerging markets disburse subsidies to help local businesses and attract FDI (Wang et al., 2020; Zhao et al., 2018). National or regional governments commonly compete fiercely to attract business investment with generous subsidies (Cui et al., 2020; Tian, 2018). For example, in China the central government uses measures of GDP growth to evaluate local governments' performance, and this is a strong incentive for local governments to attract investment, especially large foreign investments. In this context, local governments often subsidize MNEs by making large areas of land available, under favorable terms. One recent high-profile example is a Tesla factory in Shanghai, which was lured to the city partly by means of an advantageous land arrangement.

Although subsidies can be enticing, applying for them is a long and frustrating process. This is because subsidy applications not only involve a large amount of paperwork and negotiations, but also have to be approved by, in many cases, a long list of government agencies. In China, an eligible firm can apply for a subsidy from a specific government agency or a package of subsidies from multiple agencies. In the latter case, the firm needs to submit the same application simultaneously to relevant government agencies. Even in the former case, where only one government agency is responsible for granting the subsidy, Chinese laws often require other agencies to verify that the applicant is complying with government rules concerning such matters as timely payment of taxes, proper treatment of employees, or strict compliance with fire control regulations. Eligibility for a subsidy does not guarantee its approval. Government officials may promise a company a subsidy; however, applications often eventually die out after a long and tedious process. This is especially the case for multinational enterprises that lack either correct information or connections with powerful government officials. Therefore, we propose the following hypothesis:

H2a: A better e-government system increases MNEs' subsidy acquisitions.

Effective government industrial policy is a key prerequisite to attracting FDI (Casey, 2006). Subsidies also serve as an effective tool to attract foreign investors and stimulate competition between governments (Dube, 2003; Kebede, 2006; Zhang, 2001). If e-government can facilitate subsidy applications it makes subsidies more attractive, especially for MNEs. Being more transparent and definitive, e-government fosters trust-building between MNEs and the government. In turn, subsidy acquisitions encourage further investments. This leads to the proposal of the following hypothesis:

H2b: MNEs' subsidy acquisitions increase the inflow of foreign direct investment.

METHODS

Sample and Data Collection

Dramatic growth in FDI, and variability in the institutional environment in sub-regions, make China a suitable context in which to study the research questions empirically (Cui et al, 2020). The reasons Chinese governments distribute subsidies can vary from increasing the employment rate, promoting R&D as well as attracting FDI. To test the hypotheses, a sample of foreign investments made by manufacturing firms in China is constructed, by utilizing the 2005-10 editions of the Annual Census of Industrial Enterprises (ACIE), compiled by the National Bureau of Statistics of China. The census data cover all manufacturing firms with annual sales over 5 million RMB (approximately US\$ 0.73 million), which makes a comprehensive dataset (Du and Mickiewicz, 2016). This source of data has been widely used in previous foreign investment research (Li & Li, 2010; Wei & Liu, 2006; Zhou & Li, 2008). From this database key data about manufacturing firms were collected, including foreign equity investment in local firms and levels of government subsidies received. Another key value, the e-government score, is sourced from the annual reports of Evaluations on Chinese Government Portals, developed by the China Software Testing Centre (CSTC), an official agency of the Ministry of Industry and Information Technology of China. Other data regarding sub-national institutional environments are sourced from the annual China City Statistical Yearbook (city GDP), annual reports of the National Economic Research Institute (NERI) (province marketization), and the annual Procuratorial Yearbook of China (province corruption).

Variables

Dependent Variable

We use foreign equity share as the proxy for foreign investment, which is measured as the ratio of foreign equity investment to total equity in a firm (Li & Li, 2010). Such ownership structure information is available in the Annual Census of Industrial Enterprises, which also classifies firms' sources of capital as: collective capital; corporate capital; individual capital; capital from Hong Kong, Macau, Taiwan; and capital from other countries. Foreign equity in this study includes investment from foreign countries (excluding Hong Kong, Macau, and Taiwan because of their special circumstances) (Blanc-Brude et al., 2014). In addition, the natural logarithm of the level of foreign equity investment is used as an alternative measure of foreign investment, to check for robustness.

Independent Variable

The E-government index is adopted as a proxy to indicate the e-government score of prefecture-level cities (Liu et al., 2012; Wu & Guo, 2015). The evaluation data are collected manually from city-level official government portals in each year. Based on a comprehensive index evaluation system, government portals can be evaluated for several primary indicators (i.e. government information disclosure, online service, public participation, daily security, user survey, website performance,

and design) as well as secondary indicators. Each indicator is allocated a certain score, and the sum of all indicators measured on a 100-point scale. A higher e-government score indicates a better-quality city-level e-government system: one that can more readily facilitate low-cost, simultaneous, communication and interaction between local firms and various government agencies.

Mediation Variable

This variable relates to level of subsidy, and is measured as the subsidy obtained from the government, divided by the firm's total assets in a given year (Lee et al., 2017). As a robustness check, the subsidy amount is used as an alternative measure. However, as this variable is highly skewed, a natural logarithm is used.

Controls

Owing to the potential influence of corporate demographics on foreign investment and government subsidy acquisition, the analysis controls for several firm-level characteristics (Li & Li, 2010; Lu et al., 2018). Firm size, measured as the natural logarithm of a firm's total assets, can have an impact on a firm's foreign investment because larger firms may have more resources to support their strategies and thus more likely to have FDI (Qian et al., 2010; Wan et al., 2010). Firm age is associated with experience and organizational inertia, which affect a firm's FDI (Patel & Cooper, 2013; Zhou, 2011). We also adopted *leverage*, measured by the debt-equity ratio, as a control because firms with high leverage can be less willing to enter other countries (Lu & Beamish, 2004; Qian et al., 2010). Firm performance, measured by return on assets (ROA), could also have an impact on a firm's FDI (Kumar et al., 2019). A Herfindahl index is used to measure industrial competition by utilizing firms' annual sales value (Li & Li, 2010). For an industry in a given year, a higher Herfindahl index value indicates a lower level of industrial competition. In addition, the analysis controls for several regional factors because of the varied development of economic and institutional environments between regions in China. City GDP is measured as the natural logarithm of the gross domestic product in each city. Province marketization is given by the marketization index derived from the annual report of the NERI (Liu et al., 2021). This index captures institutional development in each province of China. Province corruption is measured as the total number of corruption cases reported in the media per 10,000 civil servants in each province (Liu et al., 2017). Finally, dummies for the year, two-digit industry, and province are used to control for unobserved heterogeneity at the provincial level (Gande et al., 2009; Mackey & Barney, 2013; Nachum, 2004).

Estimation Model

The final sample comprises 1,275,844 firm-year observations involving 410,274 unique manufacturing firms. To test the hypotheses, the ordinary least squares (OLS) technique is used. The model specifications for the hypotheses are estimated as follows:

Equation 1: $Y=cX+e_1$

Equation 2: $M=aX+e_2$

Equation 3: $Y=bM+e_3$

Equation 4: $Y=c'X+b'M+e_4$

where controls indicate a set of control variables and comprise the error term.

To test the mediating effect (Hypothesis 2), this analysis adopts the methodology proposed by Baron and Kenny (1986), which uses simultaneous path models (Skrondal and Rabe-Hesketh, 2004). Specifically, there are four steps in the test for mediation: Step 1 (Equation 1) shows a significant relationship between the independent variable and dependent variable; Step 2 (Equation 2) illustrates a significant effect of the independent variable on the mediator. Step 3 (Equation 3) shows that a significant relationship exists between the mediator and the dependent variable, and Step 4 (Equation 4) is to demonstrate that the effect of the independent variable on the dependent variable is weakened after including the mediator in the model. When these four steps are satisfied, a mediation effect occurs

Table 1. Descriptive statistics and correlation matrix

Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11
Foreign investment	0.20	0.37	1										
E-government score	0.42	0.17	0.11	1									
Government subsidy ^a	0.00	0.04	0.04	-0.01	1								
Firm size ^a	9.62	1.52	-0.13	0.03	-0.03	1							
Firm age	8.12	11.28	0.01	-0.00	0.01	0.16	1						
Firm leverage	3.41	345.27	0.01	-0.00	0.07	-0.04	-0.00	1					
Firm performance	0.37	112.02	0.01	0.00	0.04	-0.02	-0.00	0.28	1				
Firm export ^a	2.38	4.25	0.18	0.17	-0.02	0.19	0.03	-0.00	-0.00	1			
Industrial competition	0.00	0.00	0.04	-0.06	0.01	0.14	0.05	0.00	0.00	-0.05	1		
City GDP ^a	16.45	0.88	-0.03	0.66	-0.03	0.09	-0.01	-0.00	-0.00	0.19	-0.07	1	
Province marketisation	8.67	1.72	-0.13	0.39	-0.03	0.02	-0.06	-0.01	-0.00	0.24	-0.11	0.56	1
Province corruption	26.76	5.68	0.17	-0.05	0.02	-0.07	0.01	-0.00	0.00	-0.05	0.02	-0.21	-0.25

Note: N = 1,275,844; ^a takes the natural logarithm transformation; correlations greater than |0.01| are significant at the 0.05 level.

in the testing models (Baron and Kenny, 1986). In addition, Sobel’s (1982) tests and bootstrapping confidence intervals (CIs) are used to check the indirect effects of government subsidies on foreign investment. It should be noted that the Sobel test assumes a normal distribution on the indirect effect of the independent variable, which may make it a conservative test (MacKinnon et al., 1995). When the Z value of the Sobel test is significant, the indirect effect of the independent variable is considered to be significant. Bootstrapping is a non-parametric method that takes the skew of the distribution into account (Shrout & Bolger, 2002). If the resultant bootstrapped CIs do not have a value of 0, the indirect effect is different from 0. Given that the Sobel test and bootstrapping CIs have different assumptions, it is advisable to use them both when testing the mediating effect.

EMPIRICAL RESULTS

Descriptive Statistics and Correlation

Table 1 summarizes the descriptive statistics including means, standard deviations and pairwise correlations for the variables used in this study. Correlation values between the included variables are low to moderate, which suggests a low risk of redundancies within this set of control variables. Calculation of variance inflation factors (VIF) shows that the mean VIF is 1.29, with a maximum value of 2.25. All VIF values are below the commonly used critical value of 5, indicating that multicollinearity is not a potential concern in the analysis (Bouquet & Birkinshaw, 2008).

Testing of Hypotheses

Table 2 reports on Model 1 and Model 3 with all control variables only; Models 2 and 4-6 were used to test Hypotheses 1 and 2. Hypothesis 1 proposed a positive relationship between e-government score and FDI. Model 4 shows that the coefficient of the e-government score is 0.038 with a p-value of 0.000. Thus, Hypothesis 1 is empirically supported. Hypothesis 2 is concerned with whether government subsidy mediates the positive effect of the e-government score on foreign investment. Following Baron and Kenny’s (1986) procedure, all four steps are completed, to test the mediation linkage. A mediation effect exists if the coefficient of the direct path between the independent variable

Table 2. Main regression results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable	Government subsidy		Foreign investment			
<i>E-government score</i>		0.007***		0.038***		0.038***
		(0.001)		(0.001)		(0.001)
<i>Government subsidy</i>					0.002***	0.002***
					(0.001)	(0.001)
<i>Firm size</i>	-0.023***	-0.023***	0.052***	0.051***	0.052***	0.051***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
<i>Firm age</i>	0.015***	0.015***	-0.025***	-0.025***	-0.025***	-0.025***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
<i>Firm leverage</i>	0.059***	0.059***	-0.000	-0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
<i>Firm performance</i>	0.022***	0.021***	0.001**	0.001*	0.001*	0.001*
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
<i>Firm export</i>	-0.003***	-0.003***	0.124***	0.0125***	0.124***	0.125***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
<i>Industrial competition</i>	0.014***	0.014***	-0.014***	-0.014***	-0.014***	-0.014***
	(0.004)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
<i>City GDP</i>	-0.000	-0.006***	0.045***	0.018***	0.045***	0.018***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
<i>Province marketisation</i>	-0.008	-0.006	0.052***	0.061***	0.052***	0.061***
	(0.007)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)
<i>Province corruption</i>	-0.007***	-0.008***	0.014***	0.013***	0.014***	0.013***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
<i>Constant</i>	0.413	0.416	1.832	1.850	1.831	1.849
	(1131.396)	(1131.343)	(678.110)	(677.546)	(678.139)	(677.599)
<i>F-value</i>	230.28	227.71	31,973.58	31,644.89	31,569.64	31,250.04
	0.014	0.014	0.662	0.662	0.662	0.662
Observations	1,275,844	1,275,844	1,275,844	1,275,844	1,275,844	1,275,844

Note: *p < 0.05; **p < 0.01; ***p < 0.001. Year dummies, industry dummies, and province dummies are included in the regressions. All variables are standardised.

(e-government score) and dependent variable (foreign investment) is reduced, after introducing the indirect path through the mediator (government subsidy) in the testing model.

Table 2 shows that all four conditions hold for the tested mediating effect. In Step 1, the positive effect of the e-government score on foreign investment, which is empirically supported in Model 4, is tested. In Step 2, Model 2 illustrates that the coefficient of e-government score on government subsidy is 0.007 with a p-value of 0.000, which suggests a positive relationship between the independent variable and mediator. This is because the e-government score means a more transparent environment and the local government are more welcoming to investors, and more subsidy is provided. In Step 3, Model 5 shows that the coefficient of government subsidy on foreign investment is 0.002, with

a p-value of 0.000, indicating a positive relationship between the mediator and dependent variable. This is because the subsidy will attract more foreign direct investments. In Step 4, Model 6 illustrates that the inclusion of government subsidy reduces the magnitude and significance of the effect of e-government score on foreign investment; the coefficients of e-government score are 0.03817 in Model 4, and 0.03815 in Model 6. Thus, the empirical results support a partial mediation role of government subsidies on the relationship between e-government score and foreign investment.

In addition, formal significant tests (Sobel and bootstrap CIs) of the indirect effect were conducted. The result of the Sobel test shows that the Sobel Z value is 3.37 with a p-value of 0.000, suggesting the existence of an indirect effect in the testing models. The results of the bootstrap test indicate that the percentile CI is (0.0000082, 0.0000267) and the Bias-corrected CI is (0.0000082, 0.0000267), further confirming the Sobel test result, with a bootstrapped 95% CI not including zero.

Checking Robustness

A variety of novel empirical test techniques, to ensure the validity of the results, was used to account for non-normality of the data; Sobel (1982) tests and bootstrapping confidence intervals (CIs) were used to check for indirect effects of subsidies on foreign investments. To further validate and check the consistency of results, several robustness tests with alternative measurements are conducted. Instead of measuring foreign investment as the ratio of foreign equity investment to total equity, the foreign equity investment amount is used to measure the dependent variable. The e-government score of prefecture-level cities is replaced by the score of provinces, as an alternative measurement of the independent variable. All testing results of robustness checks are shown in Models 7 to 12 (see Table 3). The results are highly robust with respect to these changes in specification.

DISCUSSION

Recognizing the impact of government intervention on FDI, we examined the mediation effect of e-government on FDI through subsidy. Our results add new insights to the current understanding of the FDI implication as well as theoretically advancing the institutional perspective by extending it to government subsidy in the international business context. Our empirical analysis of FDI ownership supports a positive relationship between e-government score and FDI (Hypothesis 1). Prior studies have mainly focused on the relationship between innovation and MNE performance (Logun, 2020; Zhang, 2001), which neglected to treat the subnational policies as a contingent factor influencing this main relationship. Our findings add to this literature by showing that subnational policies like local government subsidies can affect FDI through an institutional perspective.

Theoretical Contributions

The findings make four contributions to the literature on e-government and FDI. First, previous research mainly focused on the ways in which e-government benefits citizens by reducing corruption (Bhuiyan, 2011; Krishnan & Teo 2012; Nistor & Adela, 2014), and by increasing citizens' confidence in governments (Picazo-Vela et al., 2012). This paper advances the discussion in the business context by exploring relationships between e-government, subsidies, and FDI. Second, the results highlight the important role of e-government in positively affecting subsidy acquisition, and contributes to research into the functions of government subsidies in general, as well as the role that e-government plays in subsidy provision and acquisition in particular. E-government integrates a variety of government agencies into one online portal, and coordinates and streamlines their functions. In so doing, e-government makes the subsidy application process easier, faster, more transparent, and fairer. This, in turn, creates a better business environment for all firms, especially foreign firms.

Third, the empirical results of this study show the strong influence of government subsidies on foreign investors. A better e-government system enhances multinational enterprises' subsidy acquisitions, and multinational enterprises' subsidy acquisitions increase FDI. Evidence from the

Table 3. Summary of regression results for robustness tests

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	<i>Government subsidy</i>	<i>Foreign investment</i>		<i>Government subsidy</i>	<i>Foreign investment</i>	
	Alternative measure of <i>Foreign investment</i>			Alternative measure of <i>E-government score</i>		
<i>E-government score</i>	0.007*** (0.001)	0.029*** (0.001)	0.029*** (0.001)	0.007*** (0.001)	0.014*** (0.001)	0.014*** (0.001)
<i>Government subsidy</i>			0.004*** (0.000)			0.002*** (0.001)
<i>Firm size</i>	-0.023*** (0.001)	0.125*** (0.001)	0.125*** (0.001)	-0.023*** (0.001)	0.052*** (0.001)	0.052*** (0.001)
<i>Firm age</i>	0.015*** (0.001)	-0.035*** (0.000)	-0.035*** (0.000)	0.015*** (0.001)	-0.025*** (0.001)	-0.025*** (0.001)
<i>Firm leverage</i>	0.059*** (0.001)	0.005*** (0.000)	0.005*** (0.000)	0.059*** (0.001)	-0.000 (0.001)	-0.000 (0.001)
<i>Firm performance</i>	0.022*** (0.001)	0.002*** (0.000)	0.002*** (0.000)	0.022*** (0.001)	0.001** (0.000)	0.001* (0.000)
<i>Firm export</i>	-0.003** (0.001)	0.129*** (0.001)	0.129*** (0.001)	-0.003*** (0.001)	0.124*** (0.001)	0.124*** (0.001)
<i>Industrial competition</i>	0.014*** (0.004)	-0.000 (0.002)	-0.000 (0.002)	0.014*** (0.004)	-0.014*** (0.002)	-0.014*** (0.002)
<i>City GDP</i>	-0.006*** (0.002)	0.020*** (0.001)	0.020*** (0.001)	-0.000 (0.001)	0.045*** (0.001)	0.045*** (0.001)
<i>Province marketisation</i>	-0.006 (0.008)	0.120*** (0.004)	0.120*** (0.004)	-0.006 (0.007)	0.056*** (0.004)	0.056*** (0.004)
<i>Province corruption</i>	-0.008*** (0.002)	0.013*** (0.001)	0.013*** (0.001)	-0.009*** (0.002)	0.011*** (0.001)	0.011*** (0.001)
<i>Constant</i>	-0.163 (0.149)	-0.096*** (0.079)	-0.095*** (0.079)	0.429 (1131.446)	1.867 (678.081)	1.866 (678.038)
<i>F-value</i>	230.17 0.014	44,773.79 0.732	44,210.14 0.732	227.63 0.014	31,577.88 0.662	31,183.91 0.662
Observations	1,279,249	1,279,249	1,279,249	1,275,844	1,275,844	1,275,844

Note: *p < 0.05; **p < 0.01; ***p < 0.001. Year dummies, industry dummies, and province dummies are included in the regressions. All variables are standardized.

annual data for 1,275,844 firms suggests that a mediation effect exists when the coefficient of the direct path between the independent variable (e-government score) and the dependent variable (foreign investment) is reduced after introducing the indirect path through the mediator (government subsidy). Fourth, this study proposes an e-government score at the urban level to measure how efficiently

e-government is performing. The results show significant relationships between this score, subsidies, and FDI. The statistical results of the hypotheses have confirmed that an e-government system, as a mediator, has a positive effect on enterprises' subsidy acquisitions and foreign direct investments. The developing trend of e-government has strengthened the relationship between regional governments and foreign enterprises, and those enterprises that can receive government support. These results make an important contribution insofar as they evaluate the relationship between the independent variable of e-government and the subsidy mediator, and add to understanding of how subsidies can influence foreign investment and promote regional economic growth.

Practical Implications

The findings of this study suggest a significant number of implications for governments and corporations. First, governments can develop e-government systems that provide more services, accelerate approval procedures, and enhance efficiency. Governments often play an essential role in facilitating a better business environment, because they can control and allocate critical resources, as well as regulate whether and how practitioners utilize resources. Multiple government agencies make it more difficult for firms to initially acquire resources or approvals, seriously inhibiting the entry of new entities. This research corroborates the view that, by improving efficiency, e-government optimizes the business environment in which firms can interact with authorities in a faster, lower-cost way, and contribute to attracting FDI. Second, these findings also suggest that firms should pay attention to the important effects of e-government on subsidy acquisitions and FDI. Subsidies from governments have been considered important for firm survival and performance, as they enable firms to obtain financial resources to buffer uncertainty and build competitive advantage (Guan & Yam, 2015; Wang et al., 2019). This study demonstrates that e-government systems facilitate subsidy acquisition, which has a positive influence on FDI. Therefore, MNEs can purposefully focus on areas where e-governments facilitate subsidy procurement.

Limitations and Future Research

The analytical framework and dataset have some limitations. No distinction is made between different types of subsidy or FDI and there is evidence that some subsidies are easier to obtain than others. For example, tax reductions are often applied nationwide in China, which provides urban governments little discretion or flexibility. In comparison, allocating land to firms involves many negotiations, and key urban government officials have discretion in deciding to whom, and on what terms, to make land available. There are also different types of FDI. Some MNEs are attracted to China by its vast market size and subsidies are probably less important. Other MNEs are more cost-sensitive, and so more likely to invest in areas where governments are more generous in handing out subsidies. Addressing this variability requires a different research design in the future. Although this study focuses on FDI in China, its findings also have implications for researchers in other developing countries. Furthermore, studies can facilitate academic debate and collaboration among international researchers on e-government. Future comparative studies could identify the differences and similarities between countries and generalize their findings. Also, this study has laid a foundation for future work by developing a framework for comparison. In particular, the concept (see Table 2) developed here for analyzing the relationship between the mediator and dependent variable (see Table 3) is of value to researchers elsewhere.

CONCLUSION

E-government adoption and implementation has the potential to improve interactions between government and MNEs. This study investigates the role of government subsidies on e-government efficiency and FDI. It concludes that government subsidies play an intermediary role in attracting MNEs, and are positively correlated with e-government efficiency. This is consistent with the findings

of other studies deploying different technologies and smaller country perimeters. Countries with better institutions – that is, greater control over corruption, a more robust rule of law, better-developed regulatory frameworks, and more efficient government frameworks – find that FDI makes a positive impact on growth. Although this study considers only FDI in China, its findings from our large sample can be generalized. Further future studies on e-government are recommended.

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