Multinational enterprises and the provision of collective goods under formal and informal institutional voids. The case of electricity in sub-Saharan Africa

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Abstract

Despite their unprecedented growth, developing countries still face severe problems in the provision of collective goods. Electricity, whose provision is scarce or unreliable in most developing regions, especially in sub-Saharan Africa, is an emblematic case. The reason for this shortage is not only imputable to the lack of effective formal institutions, but also to the inefficacy of informal institutions in enabling alternative solutions for the production, transmission and distribution of electricity. In this context of "double institutional void", multinational enterprises (MNEs) can play a decisive role. However, we claim that their effectiveness depends on both the formal and informal institutional proximity that exists between the country of origin and the destination of the multinational company. Our econometric analysis relies on a sample of pairs of home-host countries, the latter of which are all from sub-Saharan Africa, observed from 2005 to 2011. Our findings confirm our expectations.

Keywords: Inward FDI; electricity; formal and informal institutions; institutional proximity; sub-Saharan Africa

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1. Introduction

The impact of multinational enterprises (MNEs) on host countries, especially developing countries, has been widely debated and has generated substantial controversy (e.g., Oetzel and Doh, 2009). On the one hand, MNEs promote economic growth by raising domestic savings, transferring technology and knowledge, increasing domestic competition and stimulating entrepreneurship (Caves, 1974; Teece, 1977); on the other hand, MNEs may crowd out local firms, introduce inappropriate technologies, constrain potential technology and knowledge spillover, and reduce domestic tax revenues because of transfer price and profit manipulation (De Backer and Sleuwagen, 2003; Haddad and Harrison, 1993). Such a controversy about the impact of MNEs is not limited to economic performance, as it also covers non-economic dimensions of development, such as environmental and social issues (Abdouli and Hammami, 2017; Hubler and Keller, 2010). We aim to join this debate by investigating the role that MNEs might play in promoting a specific dimension of development, that is, the access to electricity of a local population (see also, D'Amelio *et al*., 2016; Sesan *et al*., 2013). Access to electricity has many effects, some of which can be considered collective goods[2]. Indirect impacts such as improved education, health, communication and safety, are essential for households, communities, industrial development and the functioning of public services (Ahlborg *et al*., 2015). However, according to the estimates of the International Energy Agency (IEA), 1.3 billion people in developing countries, which is equivalent to 17 per cent of the global population, had not access to electricity in 2013. Nearly 97 per cent of those people live in sub-Saharan Africa (SSA) and developing Asia (IEA, 2014). This severe shortage of electricity access is mainly due to the decline or slowdown in infrastructure investments and maintenance for the production, transmission and distribution of electricity in the last half of the twentieth century (Robbins and Perkins, 2012)[3].

We analyze the determinants of electricity access, considering the results of two research traditions, namely the transaction cost economics of infrastructure provision (Ostrom et al., 1993; Levy and Spiller, 1994; Henisz and Zelner, 2001; Henisz, 2002; Spiller, 2013) and the institutional theory of organizations[4]

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[2] Collective goods are commodities, functions and services that provide positive externalities to local collectivities and whose supply is assured by governments and/or private organizations. These goods are either non-excludable but rival or non-rival but excludable, i.e. "impure" public goods (Boddewyn and Doh, 2011).

[3] The reasons for this decline are complex and vary across countries. However, some common features can be identified. Namely, the decline of state revenues stemming from the commodity price crisis of the 1970s, political and economic instability and rising debts. These factors have been reinforced by the scarce attention of the Millennium Development Goals to the importance of the electricity infrastructure in meeting development targets (Robbins and Perkins, 2012).

[4] We are aware that the societal role of MNEs can be studied adopting different theoretical lens (see Forsgren, 2017). However, echoing Forsgren (pp. 144), "the (institutionalization) theory is quite mixed from a societal point of view. One strand within the theory emphasizes the/a multinational firm's tendency to adapt to external institutions in terms of rules, norms and values.

(for a recent literature review with specific reference to emerging countries, see Rottig, 2016). While transaction cost studies have highlighted that well-functioning formal and informal institutions are necessary to remedy market and governmental failures in the infrastructure sectors, institutional theorists have emphasized that the social environment and its formal and informal "rules of the game" affect an organization's structure and actions. Formal institutions are rules that are observable through written documents, or rules that are determined and executed through formal positions, such as authority or ownership. They include juridical rules, explicit incentives, contractual terms and economic rules/property rights (North, 1990). Informal institutions are non-codified systems of shared values and collective understanding, which shape cohesion and coordination among individuals in a society (Holmes *et al.,* 2013; DiMaggio and Powell, 1983).

Electricity shortage could stem from the failure of formal institutions to ensure that governments provide electricity infrastructures or regulate private utilities (Gillanders, 2014; Henisz, 2002; Levy and Spiller, 1994). It could also arise from the inability of informal institutions to promote self-organized collective actions, i.e. cooperatives and non-profit organizations (NGOs) that develop and operate decentralized systems for the generation, transmission and distribution of electricity (Hansmann, 1996; Ostrom *et al*., 1993; Teegen, 2003). However, we argue that when both formal and informal institutions fail to develop lasting solutions for the provision of electricity to a local population, MNEs may actively participate in the development, maintenance and operation of an electricity infrastructure, alone or in partnership with for-profit local organizations or NGOs (Boddewyn and Doh, 2011). Both market and non-market strategies are behind the engagement of MNEs in electricity provision. Electricity provision is the core mission of foreign utilities that enter liberalized local markets by leveraging resources and competences that have cumulated in their home countries and on international markets (Mbalyohere et al., 2017). Secondly, MNEs from energy-intensive industries have traditionally invested in generation and transmission infrastructures to grant a reliable and cost-effective supply for their own operations. Mining companies are a quintessential example of this market strategy (Banerjee et al. 2014, pp. 43-55). In fact, some of them are abandoning the traditional "enclave" approach and are cooperating with local

In that sense, it has a quite passive or reactive role. But […] other themes in the theory emphasize that multinational firms can have a much more proactive role vis-à-vis society. These themes leave room for the idea that powerful multinationals can shape the environment in such a way that they maximize their own short-term profits instead of being beneficial for society in the long- run. The outcome hinges on the power balance between the multinational firm and the surrounding society." Thus, as we are dealing with the role of institutions on the one hand, and the MNEs' search for legitimacy through market and non-market strategies, on the other, we believe our context is particularly appropriate to understand the "balance between the multinational firm and the surrounding society". We are particularly grateful to an anonymous Referee who stimulated us to better justify our choice.

governments to provide electricity infrastructures that serve both their operations and local users (Robbins and Perkins, 2012; Toledano, 2012; Banerjee et al. 2014, pp. 57-80). Finally, the activism of MNEs in electricity provision functions as a non-market strategy, because promoting the local population's access to electricity is mainly a means of gaining legitimacy with local stakeholders, thus raising the likelihood of success in their own core businesses (Holburn and Zelner, 2010).

We also acknowledge that when analyzing the role of MNEs in foreign countries, it is important to take into account the institutional environment of their country of origin, namely the institutional proximity between the MNE's home and host country. In fact, managers' competences depend on their specific formal and informal institutional setting (Kostova and Zaheer, 1999); thus, we expect that the MNEs that are more effective in developing electricity infrastructure and raising access to electricity will be those from countries that are institutionally closer to the host countries (Cuervo-Cazurra and Genc, 2008).

In this paper, we focus on Sub Saharan Africa (SSA), as this is one of the regions in the world which, according to UNCTAD data, has experienced the greatest increase in the presence of MNEs over the last decade, namely a 120 per cent increase in inward foreign direct investment (FDI) flows from 2005 to 2014. In fact, a stable economic growth, a burgeoning middle class, an increasing purchasing power and a youthful population has led Ernest and Young to rank SSA as the second most attractive region in the world in 2014 (E&Y, 2014). Nevertheless, the same region, with 68 per cent of the population (i.e., 634 million people) without access to electricity, has the lowest access to electricity rate in the world (IEA, 2014). In this context, MNEs can clearly play a role in stimulating the long-term development of the region.

In order to test how the impact of MNEs on the access to electricity is moderated by the quality of institutions, we adopt the infrastructure deployment model that Henisz and Zelner (2001) used to study the institutional determinants of telecommunication infrastructures. The results, obtained by means of panel data techniques, confirm that FDI and MNEs can raise the access to electricity of a local population, depending on both the formal and informal institutions of the country of origin and the destination of the investment. In other words, in countries where not only formal but also informal institutions are weak, MNEs can be a viable tool to raise the access to electricity of the local population. This is more likely to be the case when the MNEs come from countries that are also weak in their informal institutional settings.

This paper contributes to the literature on the impact of MNEs on developing countries and the role of (formal and informal) institutions therein, by focusing on an important prerequisite for development – namely, the provision of electricity.

This article is organized as follows. Our conceptual framework is presented in section 2. Section 3 illustrates the data and the variables employed in our empirical analysis. Section 4 describes the model adopted to test our hypotheses. Sections 5 and 6 present the results and robustness checks, respectively. Finally, section 7 concludes/introduces our conclusions.

2. Conceptual Framework – The role of institutions and MNEs in the provision of electricity

The provision of infrastructures and other collective goods has been widely investigated through conceptual frameworks that combine transaction cost economics with a thorough analysis of institutions across different geographic contexts (e.g. Ostrom et al., 1993; Levy and Spiller, 1994; Henisz and Zelner, 2001; Henisz, 2002; Spiller, 2013).

Infrastructure assets are highly specific and not re-deployable; they enjoy important economies of scale and scope, and have a broad range of domestic users (Levy and Spiller, 1994). The combination of these features generates transaction costs and makes infrastructures highly vulnerable to expropriation risks, unless the hold-up problem is alleviated through appropriate formal institutions (Levy and Spiller, 1994; Henisz, 2002). If formal institutions are well-designed and protected, the State manages to provide or to regulate electricity infrastructures. However, another body of transaction cost economics studies emphasizes that centralized institutional arrangements are unlikely to efficiently coordinate the multiple independent actions that are necessary to develop, maintain and operate infrastructures (Ostrom, 1990, pp. 38-39), in part because they rarely adapt to specific local circumstances and needs (Ostrom et al., 1993, pp. 141-156). More generally, in developing countries, the functioning of formal institutions can suffer to various degrees when the judicial system is inefficient, regulation is misguided and information is not reliable, thus generating, what -Khanna and Palepu (1997) called, *formal institutional voids*. When this is the case, national governments are likely to be ineffective in providing and/or regulating electricity infrastructures.

In a context of formal institutional voids, informal institutions can play a crucial role in supporting the provision of collective goods (Teegen, 2003). In fact, informal institutions may be seen as enabling conditions and, especially in emerging and developing markets, have become crucial for economic activity, compared to formal institutions that drive economic activity on developed markets (Khanna and Palepu, 2010). In the electricity sector, the existence of informal institutions may enable self-organized collective actions, namely NGOs or electricity cooperatives, which are owned and managed by a group of consumers or by local communities, and often supplant State-owned and/or regulated utilities (Ostrom

et al., 1993; Hansmann, 1996), owing to reasons that have been explained by the theorists of informal institutions.

Informal institutions emerge in response to repeatedly encountered social and/or economic problems, and they mirror the social capital of the country, understood as the "goodwill available to individuals or groups, whose source lies in the structure and content of the actor's social relations" (Adler and Kwon, 2002: 23). A higher social capital corresponds to stronger links among individuals and/or groups, thus lowering transaction costs, favoring cohesiveness and facilitating the pursuit of collective goals (Sandefyr and Laumann, 1998). Thus, informal institutions are related to the social structure, namely the level of trust and collectivism among the individuals or groups that compose a society (Leana and Van Buren, 1999; London and Hart, 2004). Trust is a "generalized expectancy held by an individual that the word, promise, oral or written statement of another individual or group can be relied upon" (Rotter, 1980:1). In economic terms, trust is a mechanism that mitigates (against) the risk of opportunistic behavior among those engaged in various types of economic transactions (Bigley and Pearce, 1998). For this reason, trust represents itself as a key motivational source of social capital (Adler and Kwon, 2002). On the other hand, collectivism, defined as the willingness and ability of individuals to define collective goals that are enacted collectively, is essential for the generation of social capital (Leana and Van Buren 1999).

This implies that collectivist and trust-based societies, where community members trust each other and act on the basis of group rationality rather than individual rationality, are more likely to self-organize and to be successful in the provision of collective goods (Holmes et al., 2013; Teegen, 2003).

However, whether a common action can be effectively organized internally by communities, namely by citizens' self-governed associations, is highly contingent to the social setting (Ostrom, 1990, pp. 55-57). Moreover, informal institutions may be poorly developed, and when this is the case, the country experiences an *informal institutional void*.

Table 1 anticipates the available arrangements to provide electricity under different combinations of formal and informal institutions. The infrastructure/infrastructural concepts include national grids that connect large production nodes to regions and large consumption areas over long distances, mini grids that connect consumers belonging to smaller local communities to local production plants, and off-grid systems that ensure autonomy of the end-users (IEA, 2014; Banerjee et al. 2014, pp. 43-55). National grids cannot be deployed and managed by decentralized players of a local nature, such as NGOs and cooperatives. However, those organizations that engage local consumers and other local players have an advantage in adapting mini and off-grid systems to local needs and circumstances.

In situations in which both formal and informal institutions are strong (North-West cell in Table 1), both State-owned or regulated utilities and NGOs or cooperatives can develop and operate electricity infrastructures of different kinds. The North-East and South-West cells in Table 1 represent situations in which strong formal institutions balance weak informal institutions and vice versa. Strong formal institutions are sufficient to ensure that State-owned or regulated utilities provide electricity, mainly through national or mini grids. On the other hand, stronger informal institutions promote the formation of NGOs and cooperatives that mainly supply electricity through off- and mini-grid systems. Finally, in a context of *double institutional void* (South-East cell in Table 1), arrangements such as State ownership, regulation, NGOs or cooperatives are unlikely to be effective, and MNEs can emerge as important actors in electricity provision, according to an emerging body of research.

[Insert Table 1 here]

Other studies (e.g., D'Amelio et al., 2016) have already shown that when formal institutions are weak, MNEs actively participate in the development of infrastructures for the provision of electricity to the local population. We claim that this is even more the case when the informal institutions are also weak, that is, where no other body is in place to provide electricity on the local market.

In fact, the engagement of MNEs with electricity infrastructure may be related to the company's market or non-market strategies (Doh et al., 2012). MNEs may develop electricity infrastructure as part of their core product/service (Mbalyohere et al., 2017)[5]. In other industries, electricity operation is part of the chain of activities necessary to supply the product; e.g. manufacturing and mining companies may engage in electricity infrastructures because they need energy to run their business activities (Robbins and Perkins, 2012; Toledano, 2012; Banerjee et al., 2014). On the other hand, MNEs could supplement governmental and non-governmental activities in the provision of electricity infrastructures as part of their non-market strategies. Corporate social responsibility and corporate political activities are instrumental in gaining the legitimacy that is necessary to countervail the liabilities of being a foreign as well as a profit-driven company[6]. By providing electricity to the local population, MNEs internalize

[5] An example is the Electricité de France Group (EDF), a global leader in the power sector, which signed several agreements with national governments and other MNEs to cooperate in the improvement of the electrification rate in several sub-Saharan countries, such as Botswana, Mali, South Africa and Senegal. This has been done through the development of on-grid and mini-grid systems.

[6] An example is AngloGold Ashanti, a South African multinational mining company that operates in Guinea and which, as a result of villagers' protests in 2012, built an electric power line from one of its mining plants to the nearby town, in order to gain legitimacy with the villagers and guarantee their business activities (Toledano, 2012).

societal failure and show commitment toward the country in which they are investing, thus gaining legitimacy with local stakeholders, e.g., civil society, politicians and local representatives (Holburn and Zelner, 2010; Buckley and Boddewyn, 2014). In fact, legitimatization with local stakeholders is fundamental to increase the chances of survival and success of foreign firms on the host market (DiMaggio and Powell, 1983).

Accordingly, our first hypothesis states as follows:

H1. *In developing countries, MNEs raise (the) access to electricity when both the formal and informal host country institutions are weak.*

However, the institutional theory suggests that MNEs must conform to the rules and requirements of the local social environments in which they operate in order to be perceived as legitimate (Rosenzweig and Singh, 1991; Westney, 1993). In fact, organizations that do not conform to the rules, values and beliefs lose the support of, and acceptance by, the surrounding society in which they are embedded (Scott, 2014). Hence, unless MNEs understand and correctly interpret the formal regulatory and informal normative and cultural rules of a foreign institutional environment, they are unlikely to succeed on that market (Kostova and Zaheer, 1999; Scott, 2014).

The effectiveness of MNEs in compensating the inability of host country institutions to provide electricity is influenced to a great extent by the proximity between the formal institutional context of the country of origin of the MNE and the institutional environment of the host country (D'Amelio et al., 2016). When this is the case, the MNE managers have already developed, at home, the capability to deal with weak formal institutions and are more effective in identifying key actors to form winning coalitions in the host country (Cuervo-Cazurra and Genc, 2008; Holburn and Zelner, 2010). However, literature has so far mainly focused on the formal institutional setting, and on (the) formal institutional proximity. We argue that the same holds for informal institutions. In fact, managers from individualist and unreliable countries are already familiar with the inability of local communities and NGOs to compensate for the weakness of national governments in implementing sound and lasting actions for the provision of electricity to local populations. For this reason, compared with MNEs from countries with strong informal institutions, MNEs from informal and institutionally weak countries are more likely to have already developed in-house alternative solutions for the provision of electricity to the population of the countries where they operate. Moreover, MNEs (coming) from institutionally similar countries are likely

to find it easier to adapt to the unique institutional environments of developing countries (Rottig, 2016). Accordingly, our second hypothesis states as follows.

H2. *In developing countries affected by formal and informal institutional voids, MNEs are more effective in raising access to electricity if they come from a similar country, not only as far as the formal institutional environment is concerned, but also the informal one.*

3. Data and descriptive statistics

3.1) Sample

Our sample is composed of pairs of home-host countries, the latter of which are all from SSA, observed from 2005 to 2011. Our dataset has been obtained from the merging of four different databases. The access to electricity rate has been sourced from the World Energy Outlook of the IEA. The formal institutional quality has been measured considering the six Worldwide Governance Indicators of the World Bank. The quality of informal institutions has been proxied by the degree of institutional collectivism (Source: GLOBE project) and interpersonal trust (Source: World Value Survey). Finally, the MNEs' presence has been measured by means of bilateral FDI directed to SSA, disaggregated according to the country of origin and the destination of the investment (Source: UNCTAD).

We adopted multiple imputation techniques to overcome the problem of missing data, especially for the variables that measure the access to electricity for local populations and inward FDI), (Allison, 2001)[7], and this has led to a final balanced sample of 1,547 observations. Table 2 reports the list of the 15 host countries and 73 home countries contained in the sample.

[Insert Table 2 here]

3.2) Dependent Variable

Access to Electricity Growth. The access to electricity rate has been sourced from the World Energy Outlook of the IEA. In other words, our dependent variable represents the annual growth of the percentage of households with access to electricity (Source: IEA). According to the definition provided by IEA, access to electricity comprises consumption of a minimum level of electricity, set equal to 250

[7] With multiple imputation, missing values are drawn from a distribution of observed variables, including the variables at stake. Multiple imputation does not entail interpolation from contiguous values. Instead, it is generated by chained equations, an option that is suitable to deal with a high proportion of missing data (Allison, 2001). Finally, in order to guarantee the consistency of the imputed data, we removed all the paired countries with less than 3 observations per variable over the 7 years.

kilowatt-hours (kWh) per year for rural households and to 500 kWh per year for urban households (IEA, 2014). This variable includes infrastructural and non-infrastructural solutions for the provision of electricity (e.g., diesel generators) and mainly refers to the supply side of electricity access. Thus, we have included control variables that capture the determinants of the electricity demand (e.g., a country's economic structure or income level) and obstacles to the development of electricity infrastructures (e.g., the percentage of rural population and population density).

Table 3 shows the data on the access to electricity from 2005 to 2011 in the host countries of our sample. Overall, the access to electricity increased in all sub-Saharan countries, with peaks in Namibia (+26%), Angola and Ghana (both +23%). The countries with the highest rate of access to electricity in 2011 are Mauritius (99%) and South Africa (85%); the most problematic countries are Congo the Democratic Republic (9%), Uganda (15%) and Kenya (19%).

[Insert Table 3 here]

3.3) Explanatory variables

FDI per capita. Bilateral inward FDI stocks disaggregated according to the home and host country have been adopted to measure the presence of MNEs (Source: UNCTAD). Since inward FDI stock is an extensive variable, which varies according to the country's size, and our dependent variable is expressed as a percentage of population, the bilateral FDI per capita has been employed[8].

Table 4 shows the distribution of the FDI per capita according to the region of origin. The European Union appears to be the main investor (28% of the total FDI per capita), and this is followed by North America (19%), South-East Asia (15%) and SSA (11%). The Chinese FDI ranks sixth, with a total amount of $19k per capita (7% of the total FDI per capita)[9].

[Insert Table 4 here]

Formal Institutional Void. The formal institutional void in a host country is measured considering the six World Bank's Worldwide Governance Indicators (WGIs) on a yearly basis, namely regulatory quality, control of corruption, voice and accountability, rule of law, governance effectiveness and political stability, and absence of violence and terrorism. We have chosen these indicators as they are good proxies of the four institutional mechanisms which, according to Bergara *et al*. (1998), are necessary

[8] As per access to electricity, this variable was also affected by missing data (26%) which were treated with multiple imputation techniques (Allison, 2001).

[9] A possible explanation for the small amount of Chinese FDI could be that Chinese companies rely heavily on government sponsored projects, and this makes the distinction between FDI and official assistance ambiguous. For instance, investments by Chinese state-owned enterprises (SOEs) can be included in the definition of official flows of development assistance if they receive subsidized state financing of the export credits (WB, 2015).

to guarantee the feasibility of infrastructure investment (for details see Appendix A.1). However, as there is not a univocal correspondence between the WGIs and these four mechanisms, all (the) six WGIs have been considered. In addition, due to the high correlation among these indicators (coefficient > 0.7 and $p<0.01$) and in line with the previous literature (e.g., Farla *et al.*, 2016), a factorial analysis has been performed, and this has led to a unique indicator of the degree of formal institutional void of a host country, as shown in Table 5. This variable has a high value when the host country is affected by a severe formal institutional void and a low value for a higher quality of formal institutions.

[Insert Table 5 here]

Informal Institutional Void. As illustrated in Section 2, a country's social capital is a major component of local informal institutions. Social capital is weaker where the degree of individualism and distrust is higher. For this reason, two variables have been used to measure the void of informal institutions in the/a host country: institutional collectivism, sourced from the Global Leadership and Organisational Behaviour Effectiveness (GLOBE) project, and the degree of interpersonal trust, sourced from the World Value Survey (WVS).

Institutional collectivism reflects "the degree to which organizational and societal institutional practices encourage and reward the collective distribution of resources and collective action" (House *et al*., 2004: 30). High institutional collectivism corresponds to a low level of informal institutional voids, while low collectivism reveals high informal institutional voids.

The degree of interpersonal trust in a society explains why actors tend to cooperate in some settings but do not cooperate in other settings (Cox *et al.*, 2009; Ostrom *et al.*, 1993). A high level of interpersonal trust corresponds to a low level of informal institutional voids, while low trust reveals high informal institutional voids.

Both variables are time invariant, since the relevant databases are not updated yearly. Institutional collectivism has been observed for 2004, while interpersonal trust has been observed for the 2005-'09 period, with different years for different countries. In principle, trust and collectivism could exhibit some degree of longitudinal variance in the panel time window. However, we are confident that the underlying variations are small, because informal institutions are endogenous to indigenous societies, a fact that makes them evolve slowly (Boettke et al., 2008).

Formal and Informal Institutional Proximity. Using the same procedures and sources presented above, we have also measured the degree of formal and informal institutional voids for the home countries. We have then measured the dyadic distance between the level of institutional void in the home and host countries by means of the Mahalanobis method, which is a better choice than the more traditional

Euclidean method, as it is scale invariant and takes into consideration the variance–covariance matrix (Berry *et al*., 2010). Finally, we have inverted the measures of institutional distance, thus obtaining the level of institutional proximity between the home and host countries, for both formal and informal institutions.

3.4) Control Variables

The statistical analysis includes a number of control variables.

First, the growth in the access to electricity rate is largely dependent on economic resources (Ahlborg *et al.*, 2015). Thus, we have introduced two dummies, that is, low-income country (LIC) and lower middle-income country (LMIC), to control for the income level of the host country. The upper middle-income country (UMIC) dummy represents the baseline. The classification comes from the World Bank and was built, on a yearly basis, using the nominal gross national income (GNI) per capita indicator[10].

In addition, in order to control for the host country's economic structure and to mitigate the lack of information about the inward FDI sector, industry and service value added variables, both of which are expressed as percentages of the gross domestic product (GDP) (Source: World Bank's Development Indicators), have been included. In other words, industry value added covers mining, manufacturing, construction, electricity, water and gas, while service value added comprises wholesale and retail trade (including hotels and restaurants), transport, government, financial, professional and personal services, such as education, health care and real estate services. The two variables take on a low value if the country is specialized in agriculture, husbandry, forestry and fishing.

Since, *ceteris paribus*, it is more difficult to increase access to electricity when a population lives in a rural area, we have included Rural population, which is measured considering the annual percentage of a population living in a rural area, and Population density, which is measured considering the number of people per square kilometer of land area. Both variables have been sourced from the World Bank's Development Indicators.

Furthermore, as electrification shows scale effects, we have controlled for the size of the country, expressed in millions of people (Source: World Bank's Development Indicators).

Finally, time and country pair dummies have been added in order to capture time varying macroeconomic shocks and unobservable country pair specific factors.

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[10] See http://data.worldbank.org/about/country-and-lending-groups accessed on 15 June 2016.

3.5) Descriptive Statistics

Table 6 shows the descriptive statistics and correlation matrix of the model variables. The overall pattern does not reveal any multi-collinearity.

[Insert Table 6 here]

In the host countries considered in the sample, the mean of the access to electricity is 59 per cent and varies from 6 to 99 per cent. FDI per capita has a large variance (standard error equal to 1496), thus reinforcing what had already emerged in Table 3: the FDI are not uniformly distributed over the host countries of the sample. Formal institutional void varies from 0 to 4, with a small standard deviation, equal to 1. On the contrary, the Degree of collectivism varies from 0 to 1, while the Degree of distrust varies from 0 to 2529. It is interesting to note that rich and urbanized countries are more individualist, but show a higher degree of interpersonal trust. In addition, in order to have a high degree of institutional collectivism, formal institutions have to be strong, but this leads to a lower level of interpersonal trust. Finally, it emerges that LIC, which are characterized by low domestic saving rates and tax revenues, are particularly sensitive to the urbanization rate.

4. Methodology

In order to analyze the determinants of electricity provision to local population, we have utilized a growth model that links infrastructure deployment to institutions (Henisz and Zelner, 2001). Equation (1) represents our baseline.

(1) $$\begin{aligned}\Delta Access\ to\ Electricity_{\,i,t} = {} & \alpha_0 + \alpha_1\, Access\ to\ Electricity_{\,i,t-1} \\ & + \beta_1\, FDI\ per\ capita_{\,i,j,t-1} + \\ & + \beta_2\, Formal\ Institutional\ Void_{\,i,t-1} + \beta_3\, Informal\ Institutional\ Void_{\,i} + \\ & + \beta_4\, FDI\ per\ capita_{\,i,j,t-1} * Formal\ Institutional\ Void_{\,i,t-1} \\ & + \beta_5\, FDI\ per\ capita_{\,i,j,t-1} * Informal\ Institutional\ Void_{\,i} \\ & + \gamma\, Z'_{i,t-1} + \delta\, D'_{i,t} + \varphi_t + \chi_{ji} + \varepsilon_{ij,t}\end{aligned}$$

where i is the host country, j is the home country, t is the year, φ_t and χ_{ji} are the unobservable year and country-pair fixed effects, respectively; $\varepsilon_{ij,t}$ is the i.i.d. disturbance term. $\Delta Access\ to\ electricity_{i,t}$ is the difference in the access to electricity rate between t and t-1 for host country i. $Access\ to\ electricity_{i,t-1}$ is the lagged dependent variable in level. Equation (1) is a reduced form specification of the dynamic investment model (see Bond and Van Reenen, 2007), since the growth of access rate is a proxy of investment, and the lagged access rate is a proxy of the installed capital stock. The equivalent model in which the dependent variable is the access rate in level can easily be obtained by adding the/a lagged

dependent variable, i.e. *Access to electricity*$_{i,t-1}$, to both sides of the equation and re-parametrizing its coefficient into $1 + \alpha_1$.

The explanatory variables are *FDI per capita* $_{i,j,t-1}$, *Formal Institutional Void*$_{i,}$ and *Informal Institutional Void*$_{i,}$. They are included in the level and in the cross products. The estimates of the $\beta_1 \ldots \beta_5$ coefficients are the main inputs of the short-run marginal effects of the FDI and institutions (see Section 5). Specification (1) is potentially able to capture long-run dynamics in the relationships between FDI, institutions and access to electricity, thanks to the presence of the lagged dependent variable. We have adopted a one-lag model specification to preserve the maximum possible number of degrees of freedom available for the estimates, but the long-term effects can be obtained by dividing the short-term effects by $-\alpha_1$ (see also Garrone and Grilli, 2010).

$Z'_{i,t-1}$ is the control vector (population, rural population, population density, and industry and service value added), lagged by one period ,while $D'_{i,t}$ is the vector of the *LIC* and *LMIC* dummies.

Equation (1) was then extended by introducing, one by one, formal and informal institutional proximity, respectively, both linearly and interacting with FDI per capita, as shown in Equation (2).

(2) $$\begin{aligned}\Delta Access\ to\ Electricity_{\,i,t} = {} & \alpha_0 + \alpha_1\, Access\ to\ Electricity_{\,i,t-1} \\ & + \beta_1\, FDI\ per\ capita_{\,i,j,t-1} + \\ & + \beta_2\, Formal\ Institutional\ Void_{\,i,t-1} + \beta_3\, Informal\ Institutional\ Void_{\,i} + \\ & + \beta_4\, FDIs\ per\ capita_{\,i,j,t-1} * Formal\ Institutional\ Void_{\,i,t-1} \\ & + \beta_5\, FDIs\ per\ capita_{\,i,j,t-1} * Informal\ Institutional\ Void_{\,i} \\ & + \beta_6\, Institutional\ Proximity_{\,i,j,t-1} + \\ & + \beta_7\, FDIs\ per\ capita_{\,i,j,t-1} * Institutional\ Proximity_{\,i,j,t-1} \\ & + \gamma\, Z'_{\,i,t-1} + \delta\, D'_{i,t} + \varphi_t + \chi_{ji} + \varepsilon_{ij,t}\end{aligned}$$

According to the literature on dynamic panel data, we have used the Arellano-Bover/Blundell-Bond Generalized Method of Moments estimator (system GMM) (Arellano and Bover, 1995; Blundell and Bond, 1998). The two-step method has been selected as it is asymptotically more efficient than the one-step method (Baltagi, 2005), and the bias in the standard errors was fixed by means of Windmeijer's (2005) correction procedure. We have controlled for the endogeneity of the lagged dependent variable, the country's economic structure, the country's income level, FDI per capita, and the level of formal and informal institutional voids of the host country, Furthermore, some external instruments have been added and treated as predetermined variables, for example, the degree of a country's globalization; the

level of human capital; the internal ethnic and religious tensions, and other dimensions of economic development not included in the multi-collinearity problem model[11].

Finally, before computing our estimates, we ran a reverse causality analysis (using the baseline presented in Equation (1)) to rule out the possibility of the presence of an electricity infrastructure attracting FDI, and not the other way around. The results confirm that causality runs from inward FDI to access to electricity growth[12].

5. Results

Table 7 shows our estimates. In Models (1), (2) and (3), informal institutional void has been measured by the degree of institutional individualism, while in Models (4), (5) and (6), informal institutional void has been measured by the degree of distrust. Models (1) and (4) represent the baseline, where we have tested the impact of FDI per capita on the access to electricity growth, on the basis of the degree of formal and informal institutional voids in the host country. We have added formal institutional proximity, in level and interacted with FDI per capita, respectively, to Models (2) and (5). Likewise, we have added informal institutional proximity, both in level and interacted with the FDI per capita, to Models (3) and (6).

[Insert Table 7 here]

The lagged dependent variable in level is negative and significant in all the models, meaning that the higher the electrification rate at time t-1, the lower the growth rate of the access to electricity at time t.

All the control variables show a steady and significant sign across all the models. In other words, the country size (population) and the population density contribute positively to the access to electricity growth, while a high rate of rural population curtails it ($p<0.01$). This confirms that an increase in the access to electricity rate mainly occurs through the development of an electricity infrastructure, which is characterized by economies of scale and density. The *LIC* dummy variable is negative and significant ($p<0.01$), possibly because an important part of the economy of these countries is represented by the mining sector, which leads to limited benefits for the local population in terms of access to electricity

[11] The level of a country's globalization has been proxied with the *KOF index of globalization* introduced by Dreher (2006). The level of human capital has been measured by the *human flight and brain drain* variable (Source: Fund for Peace). The internal tensions have been represented by the *group grievance* variable (Source: Fund for Peace). Finally, economic development has been expressed by the *poverty and economic decline* variable that aggregates dimensions such as unemployment, youth unemployment, economic deficit, government depth, inflation, purchasing power and GDP growth (Source: Fund for Peace).

[12] The results of the reverse causality analysis have not been reported for the sake of space; however, they are available upon request.

(WB, 2015). In fact, a recent study of the World Bank on more than four hundred mining projects in the SSA has shown that mining companies often use their own generators or source electricity from the national grid, while only rarely do they sell excess power to the grid or electrify the neighboring rural population (WB, 2015)[13]. For this reason, the negative effect is not that surprising. Finally, as expected, a higher level of service value added increases the growth of the access to the electricity rate, while industry value added is not significant.

The estimates in Table 7 confirm that countries void of effective institutions experience a slower growth in access to electricity (D'Amelio et al., 2016). However, the effect of individual institutional components appears to depend on the specifications adopted. We find that a high degree of individualism negatively affects the growth of the access to electricity, while the degree of distrust alone is not significant. This suggests that societies in which community members show a cooperative behavior are more likely to enable electricity cooperatives and NGOs that are effective in the provision of electricity. In fact, high collectivism reduces the costs of monitoring the actions of each other, and the probability of free riding (Ostrom, 2000). After controlling for the degree of individualism, it is possible to state that formal institutions are unlikely to play a significant role by themselves. On the contrary, interpersonal trust alone is not a *sine qua non* precondition for the success of informal institutions in creating alternative solutions for an increase in access to electricity for a local population. After controlling for trust, it has been found that formal institutions appear to drive electricity provision. Although *FDI per capita* does not affect our dependent variable in Model (1), it becomes positive and statistically significant when interacted with formal and informal institutional voids.

In order to better gage the moderating role of the formal and informal institutional voids of a host country, it is necessary to calculate the marginal effects. Therefore, we have estimated the marginal effects of *FDI per capita* on *ΔAccess to electricity* through the following formula.

$$\left|\frac{\partial(\Delta\text{Access to electricity}_{i,t})}{\partial(\text{FDI per capita}_{i,j,t-1})}\right| = \beta_1 + \beta_4(Formal\ Institutional\ Voids_{i,t-1})_{max} + \beta_5(Informal\ Institutional\ Void_i)_{max}$$

The estimates of marginal effects are reported in Table 8, and they show that FDI stimulates the growth of the access to electricity of a local population when the host countries suffer from a double institutional void, i.e. both formal and informal institutions are weak (magnitude of 0.02 and $p<0.05$). This confirms our first hypothesis.

[13] See https://databox.worldbank.org/Extractives/Africa_PowerMining_Projects_Database/ez5p-5pcx; accessed on 11 June 2016.

[Insert Table 8 here]

We have introduced formal and informal institutional proximity, and the interactions with FDI per capita to Models (2), (3), (5) and (6) in Table 6. Even in this case, marginal effects are needed to interpret the role of host institutions and institutional proximity between the host and home countries. Namely:

$$\left|\frac{\partial(\Delta\text{Access to electricity}_{i.t})}{\partial(\text{FDI per capita}_{i,j,t-1})}\right| =$$

$$\beta_1 + \beta_4(Formal\ Institutional\ Voids_{i,t-1})_{max} + \beta_5(Informal\ Institutional\ Void_i)_{max} + \beta_6(Institutional\ Proximity_{i,t-1})_{max}$$

The results are reported in Table 8, and they show that the FDI in host countries affected by both formal and informal institutional voids only increase (the) access to electricity if it comes from countries that are close in both the formal and informal institutional environments of the host countries. This confirms our second hypothesis. However, our findings reveal that it is much more important to come from countries with a similar degree of interpersonal trust (magnitude of 71 and $p<0.05$) than from countries with a similar degree of institutional collectivism (magnitude of 0.02 and $p<0.05$).

6. Robustness test

In order to test the goodness of our results, we ran our model using an alternative measurement of the quality of informal institutions: Hofstede's individualism versus collectivism (Hofstede *et al.*, 2010). This variable has a high value when the society is considered individualist, which means that individuals are expected to only take care of themselves and their immediate families. This variable instead has a low value when the society is collectivist, which means that individuals can expect their relatives or members of a particular group to look after them in exchange for unquestioning loyalty.

The estimates and computed marginal effects are shown in Tables 9 and 10, respectively. The results are in line with those obtained with the other two dimensions of institutional voids, especially with the degree of institutional collectivism sourced from the GLOBE project.

[Insert Table 9 here]

[Insert Table 10 here]

7. Conclusion

7.1. Summary of findings

In this paper, we have added to the literature on the impact of FDI and MNEs on host country development. We have focused on a specific dimension of development, namely access to electricity, and we have analyzed the phenomenon through an institutional theory lens (North, 1990; Ostrom, 2000),

arguing that low rates of access to electricity are mainly derived from the weakness of institutions, and that both formal and informal institutions should be taken into consideration.

We have in particular studied whether and to what extent, in a context of formal and informal institutional void, MNEs can alleviate the shortage of access to electricity of the host country. In doing so, we have taken into consideration the institutional framework not only of the country of destination of the MNEs, but also of the country of origin, on the basis of the literature on the competitive advantage of firms in developing countries (Cuervo-Cazurra and Genc, 2008; Kostova and Zaheer, 1999). We have focused on SSA, a region that in the past 10 years has witnessed an increasing presence of MNEs, but where only a small proportion of the population has access to electricity.

Our empirical findings, obtained with panel data techniques, reveal that MNEs in developing countries affected by formal and informal institutional voids can raise the access to electricity of the local populations. However, this is only true when they come from countries that are similar as far as both the formal and informal institutional environments are concerned. The competitive advantage that stems from (the) similarity in the institutional setting is stronger when informal institutions are also taken into account. MNEs from unreliable societies (i.e., where the level of trust between individuals is low) are in particular able to deal with the lack of strong informal institutions and have a greater impact on the electrification of the developing countries where they invest.

7.2. Managerial and policy implications

This paper also introduces important managerial and policy implications for both the governments and MNE managers of developing countries. As far as policy implications are concerned, our results suggest that FDI attraction polices should take into account both formal and informal institutional proximity with the home countries of the MNEs, as these conditions seem to foster the energy development of host countries (thus paving the way to the long-term and inclusive development of their countries).

Likewise, as far as managerial implications are concerned, those MNEs that are looking for legitimacy in foreign countries should be aware of the role of institutional proximity when undertaking partnerships with local governments and/or local cooperatives and NGOs. Our results also suggest, to MNEs' managers, which dimensions of informal institutions might be more effective to gain legitimacy in a foreign country, in order to succeed in aligning their business considerations and their social engagement with societal benefits (Nachum, 2017).

7.3. Limitations

Although the results of our empirical analysis appear quite robust across the specifications, we are aware that we had to deal with missing data through multiple imputation techniques in order to make the sample statistically acceptable. Moreover, the quality of formal and informal institutions in host countries may influence the decisions of MNEs to expand, renew and operate electricity infrastructures through multiple market, social and organizational mechanisms. Our panel data model has allowed us to tackle the relationship between electricity access and institutional voids and institutional proximity, and to gage its significance, more than to understand how the effects of institutions occur. We believe that qualitative research, e.g. a multiple case study, would now be necessary to answer the "how" question and to learn about the organizational and social processes through which MNEs improve access to electricity for the/a local population.

7.4. Directions for future research

Our conclusions can be considered important, not only because we have emphasized the role of informal institutions and the related informal institutionally proximity as moderating factors in the relationship between MNEs and local development, but also in terms of their impact on research that focuses on emerging markets and under-researched "frontier markets", like those in Sub-Saharan Africa.

We have discussed how MNEs may foster access to energy in a local context, as a result of both market and non-market strategies, although MNEs currently invest in developing countries for different reasons, that is, from purely resource-seeking reasons to knowledge-seeking reasons, especially in search of bottom-of-the-pyramid innovations (Chikhouni et al., 2017). These emerging motivations for internationalization may lead to a different balance between market and non-market strategies, and to a different involvement (and, consequently, impact) of MNEs within the local context.

We also believe that future research opportunities exist to investigate the role of MNEs in fostering local development, by adopting a firm-level analysis. In fact, while the novelty of the paper is that it integrates the study of the impact of MNEs on the institutional distance, to the study of informal institutions, we have adopted a country-level perspective. The motivations of MNEs underlying the specific FDI initiative may lead to different types of partnerships with local communities and NGOs. In addition, it would be possible to study the impact that the internalization of societal failures, through the provision of electricity, has on firm performance.

Finally, our results have the potential to add to the current understanding of the role of private investment on development; however, it would be interesting to understand whether local vs. foreign MNEs actually differ in their potential impact on the local context.

The implementation of these ideas rank high in our research agenda.

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Tables

Table 1. Options for electricity provision in developing countries under different combinations of formal and informal institutions

		Formal Institutions	
		Strong	*Weak*
Informal Institutions	*Strong*	Electricity provided by governments (or regulated utilities), NGOs and electricity cooperatives through national grids, mini grids or off-grid systems	Electricity provided by NGOs and electricity cooperatives) through off- or mini-grid systems
	Weak	Electricity provided by the governments (or regulated utilities) through national or mini grids	Electricity provided by MNEs through national grids or mini-grid systems

Sources: Authors' analysis.

Table 2. Home and host country pairs in our dataset.

Home countries			Host countries
Angola	Israel	Saudi Arabia	South Africa
Argentina	Italy	Seychelles	Ghana
Aruba	Japan	Singapore	Mauritius
Australia	Kenya	Slovenia	Angola
Austria	Korea, Rep.	South Africa	Cameroon
Bahamas, The	Lebanon	Spain	Congo, Rep.
Bahrain	Liberia	Sri Lanka	Congo, Dem. Rep.
Belgium	Libya	Swaziland	Gabon
Bermuda	Liechtenstein	Sweden	Kenya
Botswana	Luxembourg	Switzerland	Uganda
Brazil	Madagascar	Taiwan, China	Eritrea
Bulgaria	Malawi	Tanzania	Ethiopia
Canada	Malaysia	Thailand	Botswana
Cayman Islands	Maldives	Togo	Namibia
China	Malta	Turkey	Nigeria
Cote d'Ivoire	Mauritius	United Kingdom	
Cyprus	Morocco	United States	
Czech Republic	Mozambique	Uganda	
Denmark	Namibia	United Arab Emirates	
Finland	Netherlands	Uruguay	
France	New Zealand	Yemen, Rep.	
Germany	Nigeria	Zambia	
Ghana	Norway	Zimbabwe	
Greece	Pakistan		
Hong Kong SAR, China	Panama		
Hungary	Paraguay		
Iceland	Philippines		
India	Poland		
Indonesia	Portugal		
Ireland	Russian Federation		

Source: Sample data from UNCTAD FDI Statistics Division on Investment and Enterprise (http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx) accessed on 15th June 2015.

Table 3. Access to electricity rate in sub-Saharan African host countries, 2005 and 2011.

	2005	2011
	(Households) access to electricity (%)	
Sub-Saharan Africa	53	67
Angola	15	38
Botswana	39	46
Cameroon	47	54
Congo, Dem. Rep.	6	9
Congo, Rep.	20	37
Eritrea	20	32
Ethiopia	15	23
Gabon	48	60
Ghana	49	72
Kenya	14	19
Mauritius	94	99
Namibia	34	60
Nigeria	46	48
South Africa	70	85
Uganda	9	15

Source: Sample data from International Energy Agency (http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/) accessed on 24th May 2016 and authors' calculation.

Table 4. Distribution of FDI per capita by region of origin.

	FDI per capita (US dollar)	%
Regions of Origin		
China (w/ Hong Kong)	*18,684*	*6.60*
East Asia (w/o China & Hong Kong)	*4,222*	*1.50*
European Union	*80,385*	*28.60*
India	*7,916*	*2.80*
Latin America & Caribbean	*20,713*	*7.40*
North Africa & Middle East	*6,541*	*2.30*
North America	*55,250*	*19.60*
Oceania	*12,014*	*4.30*
Russia	*153*	*0.10*
South East Asia	*42,543*	*15.10*
South Asia (w/o India)	*1,921*	*0.70*
Sub-Saharan Africa	*30,923*	*11.00*
Total	*281,264*	

Source: Sample data from UNCTAD FDI Statistics Division on Investment and Enterprise (http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx) accessed on 15th March 2015 and authors' calculation.

Table 5. Formal institutional voids: factor analysis results.

	Formal Institutional Void
Regulatory Quality	0.94
Control of Corruption	0.94
Governance Effectiveness	0.96
Rule of Law	0.96
Voice and Accountability	0.95
Political Stability	0.82

Note: N = 1547.
Source: Authors' calculation.

Table 6. Sample variables: descriptive statistics and correlation matrix (N=1 547).

	Variable	Mean	Std. Dev.	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1)	Access to electricity	58.91	28.07	5.80	99.00	1																
(2)	Population	29.21	24.55	1.20	160.00	-0.12*	1															
(3)	Rural population	50.72	16.46	13.85	86.75	-0.42*	0.02	1														
(4)	Population density	170.76	205.00	2.46	633.52	0.62*	-0.47*	0.17*	1													
(5)	Industry value added	32.79	13.74	10.39	77.41	-0.16*	-0.27*	-0.49*	-0.28*	1												
(6)	Services value added	55.23	14.12	18.91	70.94	0.63*	0.12*	-0.02	0.40*	-0.60*	1											
(7)	LIC	0.28	0.45	0.00	1.00	-0.59*	0.21*	0.65*	-0.17*	-0.42*	-0.29*	1										
(8)	LMIC	0.13	0.34	0.00	1.00	-0.22*	-0.22*	-0.11*	-0.19*	0.50*	-0.54*	-0.24*	1									
(9)	FDI per capita	181.81	1496.38	0.04	39379.23	0.11*	-0.12*	0.02	0.17*	-0.02	0.07*	-0.07*	-0.01	1								
(10)	Formal institutional voids	1.27	1.00	0.00	3.76	-0.78*	0.19*	0.26*	-0.57*	0.34*	-0.76*	0.46*	0.44*	-0.10*	1							
(11)	Informal institutional voids (Hofstede)	38.67	21.12	15.00	65.00	0.34*	0.39*	-0.45*	-0.26*	-0.03	0.56*	-0.52*	-0.35*	-0.05*	-0.51*	1						
(12)	Informal institutional voids (individualism)	0.53	0.30	0.00	0.85	0.15*	0.26*	-0.57*	-0.44*	0.38*	0.20*	-0.67*	0.05*	-0.05*	-0.11*	0.79*	1					
(13)	Informal institutional voids (distrust)	1200.54	1087.68	0.00	2529.00	-0.17*	-0.34*	0.62*	0.45*	-0.27*	-0.20*	0.56*	0.03	0.07*	0.24*	-0.83*	-0.83*	1				
(14)	Formal institutional proximity	6.57	1.47	0.00	8.57	0.21*	0.11*	-0.13*	-0.03	-0.21*	0.23*	-0.05*	-0.17*	-0.02	-0.32*	0.23*	0.05*	-0.15*	1			
(15)	Informal institutional proximity (Hofstede)	2.75	0.92	0.00	4.45	-0.04*	-0.19*	0.30*	0.24*	-0.04	-0.03	0.07*	0.06*	0.02	0.07*	-0.31*	-0.24*	0.35*	-0.03	1		
(16)	Informal institutional proximity (individualism)	4.88	1.36	0.00	6.71	-0.12*	-0.22*	0.09*	-0.02	0.21*	-0.03	-0.21*	0.10*	0.07*	0.11*	0.01	0.21*	0.07*	-0.28*	0.11*	1	
(17)	Informal institutional proximity (distrust)	8.47	2.00	0.00	9.96	0.03	0.01	-0.04	0.06*	0.01	-0.12*	0.06*	0.06*	-0.03	0.10*	-0.16*	-0.11*	0.15*	-0.11*	-0.13*	-0.09*	1

Source: Authors' calculation. * p<0.10.

Table 7. System GMM Estimates.

	Informal Institutional Void: Degree of Individualism			Informal Institutional Void: Degree of Distrust		
VARIABLES	(1) Host Formal and Informal Institutional Void	(2) Formal Institutional Proximity	(3) Informal Institutional Proximity	(4) Host Formal and Informal Institutional Void	(5) Formal Institutional Proximity	(6) Informal Institutional Proximity
Access to electricity t-1	-0.70***	-0.65***	-0.67***	-0.67***	-0.65***	-0.73***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
Population t-1	0.16***	0.16***	0.09***	0.14***	0.13***	0.14***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Rural population t-1	-0.39***	-0.37***	-0.25***	-0.47***	-0.45***	-0.55***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)
Population density t-1	0.04***	0.033***	0.03***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Industry value added t-1	-0.14	-0.14	-0.09	-0.01	-0.01	0.07
	(0.11)	(0.11)	(0.11)	(0.08)	(0.08)	(0.09)
Services value added t-1	0.34***	0.22**	0.34***	0.30***	0.29***	0.54***
	(0.1)	(0.1)	(0.11)	(0.08)	(0.08)	(0.09)
LMIC	-4.45*	-4.1	-8.13***	5.62***	5.64***	7.80***
	(2.61)	(2.53)	(2.59)	(1.62)	(1.64)	(1.88)
LIC	-24.55***	-21.32***	-27.89***	-	-	-
	(4.37)	(4.09)	(4.08)			
FDI per capita t-1	-0.02**	-0.03	0.04	-0.004	-0.05	-0.003
	(0.02)	(0.03)	(0.04)	(0.004)	(0.04)	(0.004)
Formal institutional void t-1	0.08	-1.34	1.01	-3.50***	-3.96***	-2.92**
	(1.33)	(1.15)	(1.51)	(1.18)	(1.26)	(1.27)
Informal institutional void	-20.22***	-16.90***	-16.67***	-0.001	-0.001	0.001
	(5.61)	(5.02)	(5.37)	(0.001)	(0.001)	(0.001)
FDI per capita t-1 * Formal institutional void t-1	0.003	0.01*	0.01*	0.01*	0.01**	0.01
	(0.003)	(0.004)	(0.01)	(0.003)	(0.003)	(0.004)
FDI per capita t-1 * Informal institutional void	0.02**	-0.02	-0.01	0.001	0.001	-0.001
	(0.01)	(0.02)	(0.02)	(0.001)	(0.001)	(0.001)
Formal institutional proximity t-1	-	-0.02	-	-	-0.09	-
		(0.4)			(0.4)	
FDI per capita t-1 * Formal institutional proximity t-1	-	0.01	-	-	0.01	-
		(0.01)			(0.01)	
Informal institutional proximity	-	-	-3.58***	-	-	0.04
			(0.96)		-	(0.23)
FDI per capita t-1 * Informal institutional proximity	-	-	-0.01	-	-	0.001**
			(0.01)			(0.001)
Constant	56.02***	55.72***	61.58***	37.76***	38.34***	30.34***
	(9.33)	(10.14)	(8.75)	(7.88)	(8.77)	(8.74)
Observations	1,326	1,326	1,326	1,326	1,326	1,105
Number of pair countries	221	221	221	221	221	221
AR(1)	-5.64	-5.58	-5.72	-5.51	-5.57	-5.012
AR(2)	0.63	1.1	0.63	1.2	1.23	0.46
Wald test	220.39	220.71	216.59	221	220.91	218.81

Source: Authors' calculation. Notes: Dependent variable ΔAccess to electricity. Two-step system-GMM. Robust standard errors in parentheses. All AR(1) test statistics statistically significant at the 1 per cent level. All AR(2) test statistics statistically insignificant. All Hansen test statistics statistically insignificant. *** Significant at 1 per cent level. ** Significant at 5 per cent level. * Significant at 10 per cent level.

Table 8. Access to electricity growth: Marginal effects of FDI per capita.

		Informal Institutional Voids: Degree of Individualism	Informal Institutional Voids: Degree of Distrust
Host Formal and Informal Institutional Void (**H1**)		0.02*	0.02*
		(0.01)	(0.11)
Host Formal and Informal Institutional Voids (**H2**)	Formal Institutional Proximity	0.02*	0.04**
		(0.01)	(0.02)
	Formal Institutional Distance	-0.02	-0.02
		(0.03)	(0.03)
Host Formal and Informal Institutional Voids (**H2**)	Informal Institutional Proximity	0.02**	70.95**
		(0.01)	(32.08)
	Informal Institutional Distance	0.07	0.01
		(0.04)	(0.01)

Two-step system GMM. Robust standard errors in parentheses.
*** Significant at 1 per cent level. ** Significant at 5 per cent level. * Significant at 10 per cent level.

Table 9. Alternative measure of quality of informal institutions: System GMM Estimates

VARIABLES	(1) Host Formal and Informal Institutional Void	(2) Formal Institutional Proximity	(3) Informal Institutional Proximity
Access to electricity t-1	-0.71***	-0.79***	-0.71***
	(0.05)	(0.06)	(0.05)
Population t-1	0.17***	0.20***	0.17***
	(0.03)	(0.04)	(0.03)
Rural population t-1	-0.39***	-0.45***	-0.39***
	(0.07)	(0.08)	(0.08)
Population density t-1	0.04***	0.04***	0.04***
	(0.01)	(0.01)	(0.01)
Industry value added t-1	-0.22**	-0.04	-0.22**
	(0.11)	(0.13)	(0.10)
Services value added t-1	0.18*	0.45***	0.17*
	(0.10)	(0.12)	(0.10)
LMIC	-3.89	-2.14	-3.84
	(2.46)	(3.08)	(2.42)
LIC	-18.27***	-16.96***	-18.08***
	(3.51)	(4.15)	(3.49)
FDI per capita t-1	-0.01	-0.02	0.001
	(0.01)	(0.02)	(0.01)
Formal institutional voids t-1	-4.24***	-4.37***	-4.16***
	(1.45)	(1.64)	(1.44)
Informal institutional void	-0.20**	-0.27***	0.19**
	(0.09)	(0.10)	(0.09)
FDI per capita t-1 * Formal institutional void t-1	0.01**	0.01*	0.01*
	(0.003)	(0.003)	(0.003)
FDI per capita t-1 * Informal institutional void	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Formal institutional proximity t-1		0.45	
		(0.46)	
FDI per capita t-1 * Formal institutional proximity t-1		0.001	
		(0.003)	
Informal institutional proximity			-0.30
			(0.55)
FDI per capita t-1 * Informal institutional proximity			-0.002
			(0.002)
Constant	65.33***	53.60***	69.70***
	(9.92)	(11.85)	(9.70)
Observations	1,326	1,105	1,326
Number of pair countries	221	221	221
AR(1)	-5.42	-4.85	-5.41
AR(2)	1.02	0.09	1.04
Wald test	220.90	219.85	220.87

Source: Authors' calculation.

Notes: Dependent variable ΔAccess to electricity. Two-step system-GMM. Robust standard errors in parentheses.
All AR(1) test statistics statistically significant at the 1 per cent level. All AR(2) test statistics statistically insignificant.
All Hansen test statistics statistically insignificant.

*** Significant at 1 per cent level. ** Significant at 5 per cent level. * Significant at 10 per cent level.

Table 10. Alternative measure of quality of informal institutions: Marginal effects of FDI per capita.

Host Formal and Informal Institutional Void	Host Formal and Informal Institutional Voids		Host Formal and Informal Institutional Voids	
	Formal Institutional Proximity	Formal Institutional Distance	Informal Institutional Proximity	Informal Institutional Distance
0.02**	0.03**	0.02	0.02*	0.02
(0.01)	(0.01)	(0.03)	(0.01)	(0.01)

Two-step system GMM. Robust standard errors in parentheses.

*** Significant at 1 per cent level. ** Significant at 5 per cent level. * Significant at 10 per cent level.

Appendix

Table A.1. Formal institutional dimensions of the provision of electricity infrastructure

WORLDWIDE GOVERNANCE INDICATORS (WGIS)[A]	WGI DEFINITION[A]	FORMAL INSTITUTIONAL DIMENSIONS[B]
Government Effectiveness	Quality of public and civil services and the degree of their independence from political pressures. Quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Government's ability in directly providing electricity; Credibility of regulatory system.
Political Stability and Absence of Violence and Terrorism	Likelihood of political instability and/or politically motivated violence, including terrorism.	Political stability.
Voice and Accountability	Extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	Administrative capabilities of the country; Judicial independence and professionalism.
Regulatory Quality	Ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Credibility of regulatory system.
Control of Corruption	Extent to which public power is exercised for private gain as well as 'capture' of the state by elites and private interests.	Credibility of regulatory system; Judicial independence and professionalism.
Rule of Law	Extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Administrative capabilities of the country; Judicial independence and professionalism.

Sources: [A] Worldwide Governance Indicators from the World Bank (http://info.worldbank.org/governance/wgi/index.aspx#home) accessed on 13rd July 2015.
[B] Bergara et al., 1998.