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The Role of Institutions in Private Participation in Infrastructure in Low- and Middle-income Countries: Greenfield versus Brownfield Projects

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Abstract

This paper aims to examine institutional effects on the private participation in infrastructure (PPI) projects by the type of greenfield and brownfield projects during the recent period for 2002-2017 with 117 low- and middle-income economies, by using the PPI and the Worldwide Governance Indicators database of the World Bank. The study contributes to enriching the evidence by updating the sample time-horizon and widening the coverage of sample economies, and by decomposing the PPI projects into greenfield and brownfield ones. The main findings of this study are summarized as follow: the institutional role in promoting the PPI projects are clearly identified in terms of government governance indicators such as government effectiveness, regulatory quality, rule of law and control of corruption; the institutional effects are confirmed to be greater on the greenfield projects than on the brownfield ones; and the macroeconomic conditions such as the market size of an economy are also significant promoters of the PPI projects.

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1. Introduction

There has been and will be an enormous demand for infrastructure in emerging market and developing economies. McKinsey Global Institute (2016), for instance, estimated that the infrastructure investment in the world would grow from 31.4 trillion US dollars (at constant 2015 prices) for 2000-2015 toward 49.1 trillion US dollars for 2016-2030, and also showed that the majority of the investment, around 60 percent of the total investment for 2016-2030, would be required in emerging market economies. In accordance with the growing trend in infrastructure investment, the "private participation" in infrastructure (PPI, hereafter) has represented a significant presence from financial and operational perspectives. Figure 1 demonstrates the increasing trends in PPI in terms of number of projects and investment commitments by the type of greenfield and brownfield projects as well as the total ones for the period between 1984 and 2018 based on the PPI database of the World Bank.[1] Figure 1 also indicates that the total trends have been dominated by the trends in the greenfield projects. Focusing on the total investment commitments, their values have grown from 1990 to 2018 by 9.2 times while the world GDP has increased during the same period by 3.6 times.[2]

The PPI is considered to be one of the styles of public-private partnerships, and its original concept seems to come from the so-called New Public Management in the United Kingdom. Advanced countries have adopted this management in their infrastructure development for the purpose of enhancing managerial skills of public organizations and reducing public sectors' inefficiency. The recent PPI emergence for emerging-market and developing economies, however, seems to have a different background. They have faced a growing infrastructure demand and at the same time a lack of fiscal space to deal with it. The PPI has helped fill the so-called infrastructure gap by leveraging financial resources with private sectors.

The question then arises at to what characterizes countries that have been successful in attracting the PPI in infrastructure projects. Banerjee et al. (2006) argues that the "institution" plays an important role in supporting the PPI, since the infrastructure investment has such unique nature as high sunk costs, economies of scale, high levels of risk and uncertainty and high transaction costs. To be specific, the institutional elements such as rule of law, regulatory quality and control of corruption are considered to reduce investment uncertainty, risk and costs in the PPI projects. Doh and Ramamurti (2003) also emphasizes the role of government in the successes and failures of infrastructure investments for investors and developers.

There have been a significant number of empirical studies examining the effects of institutional qualities on economic development in general (e.g., North 1990, Rodrik et al. 2002, Lee and Kim 2009, Vaal and Ebben 2011 and Flachaire et al. 2014). There have, however,

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[1] The PPI Database of the World Bank is obtained by the website: https://ppi.worldbank.org/en/customquery.

[2] The data of the world GDP is retrieved from the World Economic Outlook Databases of the International Monetary Fund: https://www.imf.org/external/pubs/ft/weo/2019/01/weodata/index.aspx.

been a relatively small number of the studies to identify the institutional effects on the development of the PPI projects. Some studies focused on specific sectors and selected countries in the PPI projects, such as Bergara et al. (1998) on electric utility, Ba et al. (2010) on power projects, Percoco (2014) on transport infrastructure, and Kasri and Wibowo (2015) on Muslim developing countries. The other studies analyzed comprehensively the institutional effects on the PPI projects for the whole sectors and for all the developing countries in relation to a wide variety of institutional variables. The following studies commonly use the PPI database of the World Bank for dependent variables, but differ in their samples of countries and periods in panel-data settings according to the availability of the data source of institutional variables: Banerjee et al. (2006) and Hammami et al. (2006) focused on around 40 developing countries for 1990-2000 and for 1990-2003, respectively, by using the International Country Risk Guide (ICRG) database as the data source of institutional variables; Basilio (2011) sampled 72 developing countries between 1990 and 2007, depending on Djankov et al. (2007) for the data source of the quality and enforceability of the legal system; and Moszoro et al. (2015) targeted 130 developing countries from 1990 to 2010, with Teorell et al. (2013) being the data source for the quality of governance. These studies above basically supported the institutional role in facilitating the PPI projects. There was, however, one contrasting outcome on the effect of "corruption" on the PPI projects: Banerjee et al. (2006) showed that the countries with higher levels of corruption attracted the PPI projects, whereas Hammami et al. (2006) and Moszoro et al. (2015) revealed that the control of and freedom from corruption contributed to attracting the private investors to the PPI projects. Banerjee et al. (2006) interpreted the "positive" corruption effect, such that countries with higher levels of corruption would be more aggressive in deregulating infrastructure and private companies would be attracted to such countries for opportunistic reasons.

This paper aims to revisit the issue of institutional role in the PPI and to reexamine empirically institutional effects on the PPI projects for the recent period for 2002-2017 with 117 developing countries, by using the PPI database and the Worldwide Governance Indicators (WGI) of the World Bank.[3] The study contributes to the literature reviewed above as follows. First, this study enriches the evidence of the institutional effects on the PPI projects by updating the sample time-horizon until 2017 and by widening the coverage of sample countries toward 117, through using the WGI database for institutional variables. The previous studies used the database of the ICRG and individual academic papers for institutional variables, but these database confined themselves to a reduced number of samples in countries and periods. The ICRG database, for instance, provides only the 83 countries (excluding the 34 ones containing Cambodia and Lao PDR) out of the 117 sample countries available in the World Bank PPI database for 2002-2017. The WGI database that this study adopts has become

[3] Although the PPI database is available for 1900-2018, the sample is confined to the period for 2002-2017 due to the data constraint of the WGI database.

available every year since 2002 and thus has been widely and commonly used for empirical studies in recent times. The WGI database definitely offers the 117 sample countries for 2002-2017, just the same samples as the PPI database provides. Through updating and widening samples, the evidence could be added also on the critical issue of the corruption effect, on which the previous studies had a contrasting outcome. Second, this study decomposes institutional effects on the PPI projects into those on greenfield and brownfield projects. The PPI Database of the World Bank contains four categories as the PPI project type: greenfield projects, brownfield projects, management and lease contracts, and divestitures. Since the greenfield and brownfield projects account for around 90 percent in terms of the cumulative number and commitments until 2018, this study focuses on the greenfield and brownfield projects out of four categories. Then this study hypothesizes that institutional effects are larger on the greenfield projects than on the brownfield ones. The greenfield projects are defined as those to build and operate a new facility, while the brownfield ones are to rehabilitate or expand an existing facility.[4] The greenfield projects thus accompanies more of the financial and operational risks and costs than the brownfield ones does. In this sense, the institutional role would be more acute in the greenfield projects than the brownfield ones. Since there have been few previous studies to disaggregate the institutional effects on the PPI by the project type, it would be significant to explore the difference in the effects between greenfield and brownfield projects.

The rest of the paper is structured as follows. The next section represents empirics on the institutional impacts on the PPI: key variables and data, methodology, estimation outcomes and discussions. The last section summarizes and concludes.

2. Empirics

This section conducts empirical analyses of the impacts of the institutional variables on the PPI projects, describing key variables and data, methodology, estimation outcomes and discussions.

2.1 Key Variables and Data

For analyzing the determinants of the PPI projects, this study sets up 6 dependent PPI variables (number and investment commitments of the total, greenfield and brownfield projects) and 11 explanatory variables (classified into 6 in institutional factors and 5 in economic conditions), by establishing 7 hypotheses. The variables and hypotheses selected here are commonly used in the previous studies in the reviewed literature. The variables are listed with their measurement and data sources in Table 1; the hypotheses are described with expected signs of coefficients attached to the variables in Table 2, and the descriptive statistics

[4] For the definition, see the website: https://ppi.worldbank.org/en/methodology/glossary.

of the variables are presented in Table 3. The details of each variable are shown as follows.

Regarding the dependent PPI variables, i.e., number of projects (PPIN) and total investment commitments (PPIV) in total, greenfield and brownfield projects, their data are retrieved from the PPI database of the World Bank. The PPI database covers data on over 6,400 infrastructure projects in 139 low- and middle-income countries, and this study samples 4,791 projects and 117 countries for the sample period for 2002-2017. The total investment commitments (PPIV) in terms of million US dollars are transformed in logarithm to avoid scaling issues. It is true that the investment vales might be better expressed as a share of GDP, but the share would be negligible for all sample countries with very little variation as Banerjee et al. (2006) suggested, and thus the share is not adopted in this study. This study hypothesizes that institutional effects should be larger on the greenfield projects than on the brownfield ones as stated before.

For the institutional variables as explanatory ones, the data comes from the WGI database of the World Bank. This study adopts all the indicators the WGI database provides: government effectiveness (GVE), regulatory quality (REQ), rule of law (ROL), control of corruption (COR), voice and accountability (VOA) and political stability and absence of violence/terrorism (PSV). Those indicators are almost corresponding to the institutional variables in the previous studies in the reviewed literature. Each of the WGI indicators takes the number ranging from approximately -2.5 (weak) to 2.5 (strong). The reasons why the WGI database is used here are as follows. First, the database has newly been developed since 1996 and the time-series data has been available every year from 2002 to the present. Second, the WGI database has wider coverage of sample developing economies than the database the previous studies used. Against the 117 sample economies available in the PPI database for 2002-2017, all the 117 economies are also available as the sample in the WGI database. The hypotheses set in this category are summarized as follows. The improvements in the indicators of GVE, REQ, ROL and VOA are likely to foster the PPI projects since they reduce the uncertainty, risk and costs. The corruption (COR) contains contrasting arguments: the control of corruption attracts the PPI projects (as in Hammami et al., 2006 and Moszoro et al., 2015), whereas the corruption itself attracts the PPI for opportunistic reasons (as in Banerjee et al., 2006). The PSV indicator also represents different arguments: the political stability provides a good environment for the PPI projects, whereas the “ethnic fractionalization” attracts more of the projects. Hammami et al. (2006), on the one hand, argues the need for controlling political risks for the PPI, but on the other hand they present the hypothesis that the PPI arrangements are likely to be positively correlated with “ethnic fractionalization”. It means that the ethnic fractionalization represents the heterogeneity of preferences in the overall population; it often leads to political tensions; and the political endeavors to satisfy the conflicting demands produce more PPI projects.

For the economic variables as explanatory ones, the study adopts five indicators: GDP per

capita (GDPPC), GDP growth (GRW), inflation (INF), exchange rate (EXR) and government budget balance (GBL). INF and GRW are expressed by year-on-year rate of changes in consumer prices and real GDP, respectively. GDPPC is shown by current US dollars and EXR is presented by the period average of national currency per US dollars. GBL is expressed by the general government net lending or borrowing as a percent of GDP. GDPPC and EXR are set in logarithm to avoid scaling issues. All the economic variables are lagged by one year as they might be endogenous to the model. The data sources of GDPPC, GRW and INF are the World Development Indicators of the World Bank, and those of EXR and BBL are the International Financial Statistics and the World Economic Outlook Databases of the International Monetary Fund, respectively. The hypotheses in this category are summarized as follows: the indicators of GDPPC and GRW representing the market size and growing demand are important determinants for the PPI projects; the macroeconomic stability represented by INF and EXR offers an attractive environment for the projects; and the budget deficits with negative GBL tend to attract more of the projects.

Then the study constructs the panel data with 117 countries for 2002-2017 for the subsequent estimation, based on the data availability of the PPI and WGI databases.

2.2 Methodologies

The study then turns to specifying the estimation equation in the following way.

$$y_{it} = \alpha + \beta * I_{it} + \gamma * E_{it} + \mu_d + \nu_t + \varepsilon_{it} \quad (1)$$

where i and t are the country and the time period; y, I, E are PPI variables (PPIN and PPIV), institutional variables (GVE, REQ, ROL, COR. VOA and PSV) and economic variables (GDPPC, GRW, INF, EXR and GBL), respectively; α, β, γ, are constant term and parameter of institutional and economic variables; μ_d, ν_t, ε_{it} are district dummies, time dummies and error term, respectively. The district herein denotes geographical regions: East Asia and Pacific, South Asia, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa and Sub-Saharan Africa, following the regional classification of the PPI database.

There would be a threat of multicollinearity among the explanatory variables. Table 4 indicates that the bivariate correlations between institutional variables are more than 0.5 except the correlation between PSV and RGQ, whereas those between economic variables are less than 0.4 in its absolute value. The variance inflation factor (VIF), a method of measuring the level of collinearity between the regressors in an equation, tells that ROL (11.934) is far beyond the standard level of collinearity and GVE (9.112), COR (7.870) and REQ (6.306) are in the risky zone inducing multicollinearity, while the other variables including all the economic ones range in the normal level. Thus the institutional variables, specifically, ROL, GVE, COR and REQ, would cause multicollinearity, and so these variables should be treated

as independent regressors in the estimation equation (1). The subsequent estimation, therefore, uses four sets of the institutional variables: (GVE, VOA, PSV), (REQ, VOA, PSV), (ROL, VOA, PSV) and (COR, VOA, PSV).

Regarding the estimation methodologies, in the regression where the dependent variable is the number of projects (PPIN), i.e., integer values that represent the number of events that occur, the study employs a count data model. Since over-dispersion occurs due to a large number of zeros in the PPI database, this study adopts the negative binomial regression model as in Banerjee et al. (2006). As for the regression in which the dependent variable is the total investment commitments (PPIV), i.e., continuous nonnegative values, the study relies on the Tobit regression model, namely, the canonical censored regression model, as in Hammami et al. (2006).

2.3 Estimation Outcomes and Discussions

Table 5 represents the estimation outcomes on the number of projects (PPIN) with the negative binomial regression model and the total investment commitments (PPIV) with the Tobit regression model, by the total, greenfield and brownfield projects. The outcomes are summarized as follows.

Regarding the institutional variables, the government governance indicators of government effectiveness (GVE), regulatory quality (REQ), rule of law (ROL) and control of corruption (COR) are identified to have significantly positive effects on all of the total, greenfield and brownfield projects in both the number of projects (PPIN) and the total investment commitments (PPIV), when their governance indicators are treated as independent regressors. It should be also noted that the coefficients of the greenfield projects in these four indicators are larger than those of the brownfield projects except the case of GVE in the PPIN with the same levels of the coefficients. As far as the governance indicators of GVE, REQ, ROL and COR are concerned, therefore, the estimation results are consistent with the hypotheses set in Table 2. Regarding the corruption-control index of COR that contains contrasting hypotheses, the result of this study supports the argument that the corruption-control tends to attract the PPI projects, proposed by Hammami et al. (2006) and Moszoro et al. (2015), but not Banerjee et al. (2006).

As for the other institutional variables, the variable of the voice and accountability (VOA) shows mixed results according to the regressions, and so does not provide any clear messages on its PPI effects. The variable of the political stability and absence of violence/terrorism (PSV), on the other hand, has significantly negative effects on all the PPI projects in both PPIN and PPIV. The effect of PSV on the PPI projects has also different arguments in its hypothesis in Table 2, and the PSV adverse effect on the PPI projects in this study might reflect the channel of the “ethnic fractionalization”.

Concerning the impacts of the economic variables on the PPI projects, the market size

represented by GDP per capita (GDPPC) has significantly positive effects on all of the total, greenfield and brownfield projects in both PPIN and PPIV, as are expected in the hypothesis in Table 2. As for the other economic indicators, the outcomes of the PPIN estimation appears to be more consistent with the hypotheses set in Table 2 than those of the PPIV estimation. It is probably because the values of investment commitments (PPIV) themselves show high fluctuations due to the timing and the size in the PPI project implementation, thereby disturbing stable correlations among the variables in the estimation. Focusing on the results of the PPIN estimation, the demand growth represented by GDP growth (GRW) has significantly positive impacts on all the PPI projects; inflation (INF) and currency depreciation (EXR) have negative signs as expected in most of the cases although their coefficients are insignificant; the government budget constraints also push up the PPI projects, as shown in the significantly negative effects of GBL on all the PPI projects.

3. Concluding Remarks

This paper aims to revisit the issue of institutional role in the PPI and to reexamine empirically institutional effects on the PPI projects by the type of greenfield and brownfield projects in the recent period for 2002-2017 with 117 low- and middle-income economies, by using the PPI and WGI database of the World Bank. The study contributes to enriching the evidence of the institutional effects on the PPI projects by updating the sample time-horizon and widening the coverage of sample economies, and by decomposing the PPI projects into greenfield and brownfield ones.

The emphases of the empirical estimation results are summarized as follow: the institutional role in promoting the PPI projects are clearly identified in terms of government governance indicators such as government effectiveness, regulatory quality, rule of law and control of corruption; the institutional effects are confirmed to be greater on the greenfield projects than on the brownfield ones; and the macroeconomic conditions such as the market size of an economy are also significant contributors of the PPI projects.

The strategic implications of this study is that the institutional improvements have been and will be still vitally important in facilitating the PPI projects in developing countries, since the greenfield projects, which are still dominant in the PPI projects, require seriously the institutional quality for reducing the uncertainty, risk and costs.

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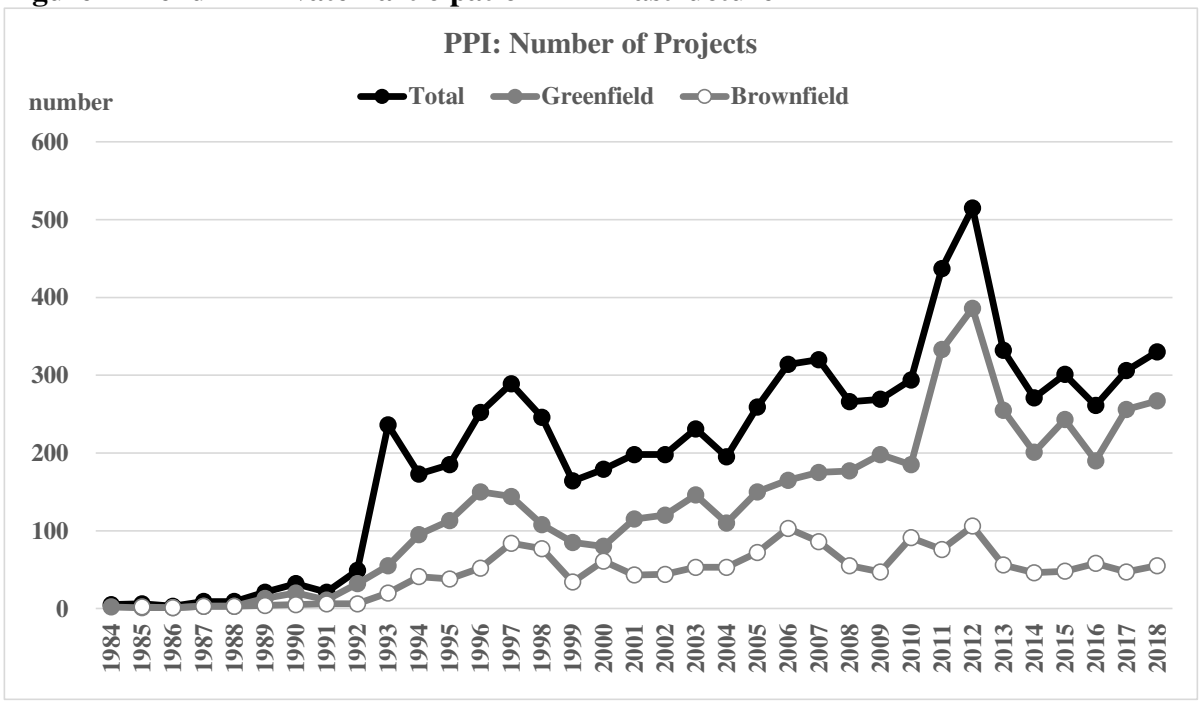
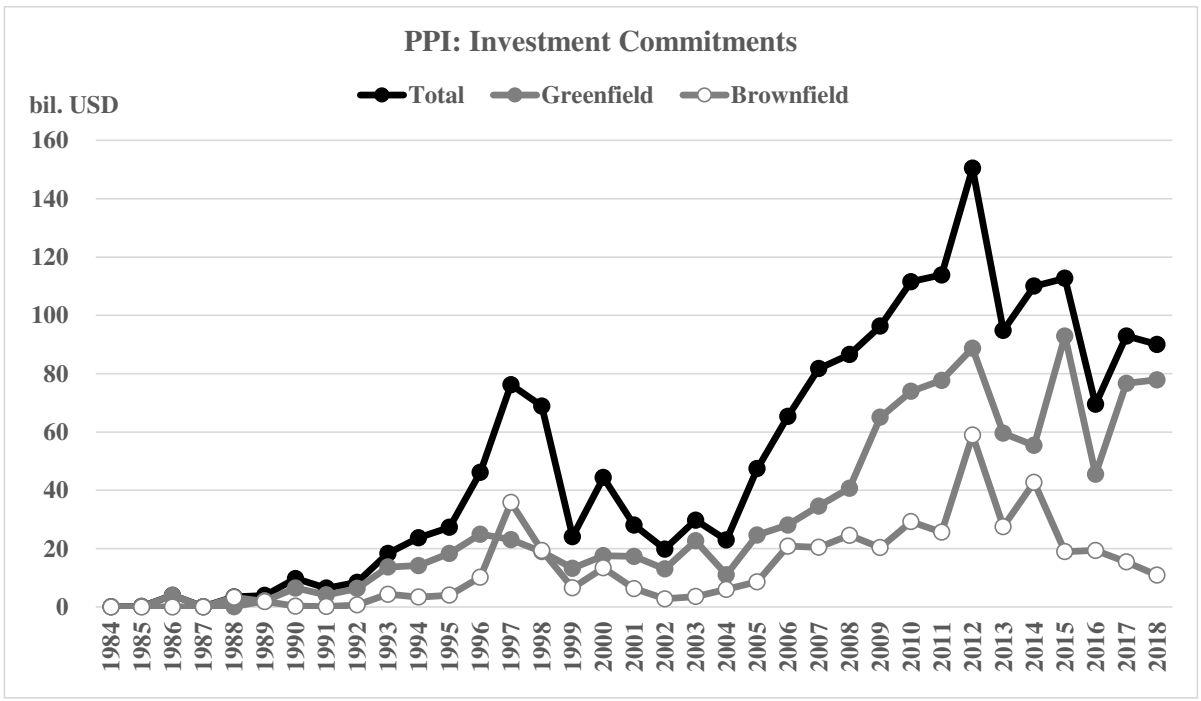
Figure 1 Trend in Private Participation in Infrastructure





Sources: Private Participation in Infrastructure Database, The World Bank

Table 1 List of Variables

Variables	Description	Data Siources
Dependent Variables		
PPIN	Number of Projects of Pivate Participation of Infrastructure (PPI) <Project Type: Total, Greenfield and Brownfield>	PPI Database, World Bank
PPIV	Total Investment Commitments of PPI [million USD, log term] <Project Type: Total, Greenfield and Brownfield>	
Explanatory Variables: Institution		
GVE	Government Effectiveness [from approximately -2.5 (weak) to 2.5 (strong)]	Worldwide Governance Indicators, World Bank
RGQ	Regulatory Quality [ditto]	
ROL	Rule of Law [ditto]	
COR	Control of Corruption[ditto]	
VOA	Voice and Accountability [ditto]	
PSV	Political Stability and Absence of Violence/Terrorism [ditto]	
Explanatory Variables: Economic Conditions		
GDPPC	GDP per capita [current USD, log term, lagged]	World Development Indicators, World Bank
GRW	GDP growth [annual %, lagged]	
INF	Inflation, consumer prices [annual %, lagged]	
EXR	National Currency per USD [period average, log term, lagged]	International Financial Statistics, IMF
GBL	General government net lending/borrowing [percent of GDP, lagged]	World Economic Outlook Databases, IMF

Sources: Author's description

Table 2 Hypotheses and Expected Signs

Variables	Hypothesises	Exp. Sign
PPIN: PPI Number PPIV: PPI Commitments	Institutional effects are larger on the "greenfield" projects than on the "brownfield" ones.	
Variables for Institution		
GVE: :Government Effectiveness RGQ: Regulatory Quality ROL: Rule of Law VOA: Voice & Accountability	The government effectiveness, regulatory quallity, rule of law and voice & accountability are more likely to reduce investment uncertainty, risk and costs, and are thus likely to foster the PPI projects.	+
COR: Control of Corruption	The control of corruption tends to attract the PPI projects due to the decline in investment costs. On the other hend, private firms might be attracted to the countries with corruptions for opportunistic reasons.	+ / -
PSV: Political Stability etc.	The political stability provides a good environment for the PPI projects. On the other hand, the "ethnic fractionalization" leading to political tentios might attract more of the PPI projetcs.	+ / -
Explanatory Variables: Economic Conditions		
GDPPC: GDP per capita GRW: GDP growth	The size of the market and the growing demand, represented by GDP per capita and GDP growth are important determinants for the PPI projects.	+
INF: Inflation EXR: Exchange Rate	The macroeconomic stability, representaed by lower inflation and stable exchange rates provides offers an attractive environment for the PPI projects.	-
GBL: Budget Balance	The countries with large deficits in their budget balances are more likely to have the PPI projects.	-

Sources: Author's description

Table 3 Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max
Dependent Variables					
PPIN Total	1,872	2.55	9.89	0	127
Greenfield	1,872	1.76	6.86	0	70
Brownfield	1,872	0.55	3.36	0	70
PPIV Total	1,872	2.21	3.05	0	10.94
Greenfield	1,872	1.69	2.82	0	10.66
Brownfield	1,872	0.73	2.00	0	10.41
Explanatory Variables: Institution					
GVE	1,865	-0.49	0.59	-2.44	1.26
RGQ	1,864	-0.48	0.64	-2.64	1.24
ROL	1,872	-0.56	0.59	-2.60	1.07
COR	1,872	-0.53	0.56	-1.86	1.56
VOA	1,872	-0.43	0.75	-2.31	1.22
PSV	1,861	-0.45	0.87	-3.31	1.38
Explanatory Variables: Economic Conditions					
GDPPC	1,830	7.62	1.03	4.71	9.68
GRW	1,819	4.66	4.94	-33.10	64.06
INF	1,762	7.13	10.30	-18.10	254.94
EXR	1,795	3.72	2.69	-2.89	22.62
GBL	1,807	-2.19	6.19	-35.39	125.13

Sources: Author's estimation

Table 4 Correlation Matrix

[Institutional Variables]

	GVE	RGQ	ROL	COR	VOA	PSV
GVE	1					
RGQ	0.818	1				
ROL	0.842	0.772	1			
COR	0.784	0.644	0.850	1		
VOA	0.578	0.671	0.686	0.642	1	
PSV	0.512	0.430	0.662	0.646	0.500	1
VIF	9.112	6.306	11.934	7.870	3.027	2.437

[Economic variables]

	GDPPC	GRW	INF	EXR	GBL
GDPPC	1				
GRW	-0.171	1			
INF	-0.148	0.029	1		
EXR	-0.365	0.056	0.018	1	
GBL	0.010	0.058	0.017	-0.040	1
VIF	3.649	1.960	1.701	2.605	1.118

Sources: Author's estimation

Table 5 Estimation Outcomes

[Number of Projects (PPIN) with Negative Binomial Regression Model]

PPIN	Total	Greenfield	Brownfield	Total	Greenfield	Brownfield
GVE	1.641 ***	1.745 ***	1.752 ***			
	(9.756)	(9.017)	(5.722)			
RGQ				1.683 ***	1.876 ***	1.568 ***
				(10.384)	(10.268)	(5.390)
ROL						
COR						
VOA	-0.187 *	-0.245 *	0.161	-0.406 ***	-0.505 ***	0.007
	(-1.695)	(-1.946)	(0.815)	(-3.418)	(-3.836)	(0.036)
PSV	-1.045 ***	-1.069 ***	-1.502 ***	-0.952 ***	-0.952 ***	-1.399 ***
	(-10.582)	(-9.383)	(-8.697)	(-9.646)	(-8.674)	(-8.124)
GDPPC	0.407 ***	0.383 ***	0.610 ***	0.597 ***	0.596 ***	0.813 ***
	(4.191)	(3.450)	(3.427)	(6.727)	(5.954)	(4.855)
GRW	0.037 **	0.042 **	0.088 ***	0.046 ***	0.055 ***	0.082 **
	(2.200)	(2.176)	(2.748)	(2.797)	(2.892)	(2.539)
INF	-0.000	-0.000	-0.011	0.015	0.015	0.001
	(-0.048)	(-0.038)	(-0.671)	(1.543)	(1.524)	(0.096)
EXR	-0.005	-0.014	-0.055	-0.009	-0.013	-0.086 *
	(-0.212)	(-0.496)	(-1.199)	(-0.396)	(-0.474)	(-1.866)
GBL	-0.042 ***	-0.054 ***	-0.049 *	-0.050 ***	-0.063 ***	-0.057 **
	(-3.098)	(-3.328)	(-1.845)	(-3.589)	(-3.866)	(-2.134)
	1,587	1,587	1,587	1,587	1587	1587

PPIN	Total	Greenfield	Brownfield	Total	Greenfield	Brownfield
GVE						
RGQ						
ROL	1.530 ***	1.740 ***	1.561 ***			
	(7.308)	(7.504)	(4.496)			
COR				0.542 ***	0.697 ***	0.591 *
				(2.895)	(3.403)	(1.800)
VOA	-0.357 ***	-0.475 ***	-0.058	-0.011	-0.115	0.319
	(-2.798)	(-3.405)	(-0.263)	(-0.088)	(-0.843)	(1.483)
PSV	-1.275 ***	-1.313 ***	-1.690 ***	-1.045 ***	-1.067 ***	-1.493 ***
	(-11.208)	(-10.307)	(-9.027)	(-9.313)	(-8.432)	(-8.052)
GDPPC	0.641 ***	0.648 ***	0.842 ***	0.798 ***	0.822 ***	1.017 ***
	(7.054)	(6.365)	(5.087)	(8.709)	(8.000)	(6.017)
GRW	0.055 ***	0.060 ***	0.113 ***	0.058 ***	0.065 ***	0.117 ***
	(3.153)	(3.015)	(3.518)	(3.270)	(3.184)	(3.548)
INF	-0.000	-0.001	-0.011	-0.008	-0.008	-0.019
	(-0.082)	(-0.109)	(-0.661)	(-0.885)	(-0.904)	(-1.129)
EXR	0.002	-0.000	-0.047	-0.011	-0.013	-0.061
	(0.086)	(-0.028)	(-1.010)	(-0.417)	(-0.446)	(-1.313)
GBL	-0.041 ***	-0.051 ***	-0.050 *	-0.070 ***	-0.085 ***	-0.074 ***
	(-2.867)	(-3.091)	(-1.898)	(-4.846)	(-5.087)	(-2.838)
Observations	1,587	1,587	1,587	1,587	1587	1587

Note: ***, **, * denote rejection of null hypothesis at the 99%, 95% and 90% level of significance, respectively. The figure in ( ) denotes t-value. The coefficients of the district and time dummies are omitted here due to the space limitation.

Sources: Author's estimation

[Total Investment Commitments (PPIV) with Tobit Regression Model]

PPIV	Total	Greenfield	Brownfield	Total	Greenfield	Brownfield
GVE	2.048 ***	1.951 ***	0.938 ***			
	(11.199)	(11.521)	(7.246)			
RGQ				2.396 ***	2.178 ***	0.922 ***
				(13.981)	(13.658)	(5.857)
ROL						
COR						
VOA	-0.097	-0.091	0.136	-0.464 ***	-0.403 ***	0.023
	(-0.703)	(-0.714)	(1.392)	(-3.254)	(-3.034)	(0.212)
PSV	-1.497 ***	-1.361 ***	-0.905 ***	-1.326 ***	-1.194 ***	-1.017 ***
	(-13.777)	(-13.528)	(-11.763)	(-12.736)	(-12.327)	(-11.897)
GDPPC	0.376 ***	0.199 **	0.281 ***	0.508 ***	0.342 ***	0.415 ***
	(3.510)	(2.011)	(3.710)	(5.148)	(3.728)	(5.842)
GRW	0.013	0.017	0.014	0.018	0.022	0.018 *
	(0.849)	(1.190)	(1.316)	(1.195)	(1.552)	(1.648)
INF	-0.012	-0.004	-0.010 *	0.008	0.013	-0.010
	(-1.307)	(-0.543)	(-1.664)	(0.931)	(1.589)	(-1.565)
EXR	0.124 ***	0.069 **	0.028	0.100 ***	0.047 *	0.038 *
	(4.047)	(2.435)	(1.307)	(3.346)	(1.696)	(1.768)
GBL	-0.027 **	-0.014	-0.008	-0.024 **	-0.012	-0.009
	(-2.367)	(-1.307)	(-1.034)	(-2.177)	(-1.182)	(-1.147)
	1,587	1,587	1,587	1,587	1587	1587

PPIV	Total	Greenfield	Brownfield	Total	Greenfield	Brownfield
GVE						
RGQ						
ROL	2.068 ***	1.950 ***	0.922 ***			
	(9.237)	(9.394)	(5.857)			
COR				1.038 ***	0.971 ***	0.565 ***
				(4.942)	(4.979)	(3.870)
VOA	-0.365 **	-0.339 **	0.023	0.067	0.071	0.182 *
	(-2.325)	(-2.329)	(0.212)	(0.444)	(0.508)	(1.731)
PSV	-1.755 ***	-1.602 ***	-1.017 ***	-1.488 ***	-1.348 ***	-0.923 ***
	(-14.448)	(-14.223)	(-11.897)	(-12.271)	(-11.980)	(-10.956)
GDPPC	0.661 ***	0.473 ***	0.415 ***	0.787 ***	0.593 ***	0.460 ***
	(6.550)	(5.059)	(5.842)	(7.713)	(6.263)	(6.492)
GRW	0.021	0.025 *	0.018 *	0.018	0.021	0.016
	(1.361)	(1.710)	(1.648)	(1.126)	(1.466)	(1.484)
INF	-0.010	-0.003	-0.010	-0.018 **	-0.010	-0.013 **
	(-1.126)	(-0.383)	(-1.565)	(-1.960)	(-1.244)	(-2.053)
EXR	0.148 ***	0.091 ***	0.038 *	0.143 ***	0.087 ***	0.039 *
	(4.734)	(3.158)	(1.768)	(4.470)	(2.924)	(1.774)
GBL	-0.029 **	-0.015	-0.009	-0.045 ***	-0.031 ***	-0.016 **
	(-2.476)	(-1.451)	(-1.147)	(-3.824)	(-2.828)	(-1.982)
Observations	1,587	1,587	1,587	1,587	1587	1587

Note: ***, **, * denote rejection of null hypothesis at the 99%, 95% and 90% level of significance, respectively. The figure in ( ) denotes t-value. The coefficients of the district and time dummies are omitted here due to the space limitation.

Sources: Author's estimation