

EXPLAINING PPP PROJECTS THROUGH POLITICAL FACTORS: AN ASSESSMENT OF DEVELOPING COUNTRIES

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ABSTRACT

This paper analyses the effect of political factors on the use of PPPs in developing countries. According to a sample of 80 low- and middle-income countries over the period 1995-2017, our findings suggest that PPP projects are affected by political ideology, the strength of the government and electoral cycles. Concretely, they tend to be used by left-wing governments to a greater extent than governments with other ideologies. PPPs also tend to be more frequently used by fragmented governments and when there is greater political competition. There is also some evidence (although slight) on the relevance of the proximity of elections in explaining PPPs in developing countries.

KEYWORDS: PPP; public private partnership; political factors, political economy; ideology; electoral cycle; political competition.

INTRODUCTION

Public Private Partnerships (PPPs) have become the most popular tools to deliver public services across the globe (Hodge and Greve, 2007; Wang et al., 2018), especially in developing countries (Jomo et al., 2016). PPPs have been used as a strategy to improve service delivery and develop huge infrastructure projects (Nederhand and Klijn, 2018). Indeed, during the Covid-19 crisis, the World Bank has supported for PPP projects, such as road projects in Brazil, renewable energy projects in India, healthcare projects in Vietnam, as well as it has supported governments to advance in PPP reforms in Nigeria, Kenya, and Uganda (Dimakou et al., 2020).

Although there is not a common definition of PPPs (Jomo et al., 2016), from the public management perspective, a PPP is a type of structured collaboration between the public and private sectors for the planning, construction and/or exploitation of facilities in which the risks, costs, benefits, resources, and responsibilities are shared or allocated (Koppenjan, 2005). Therefore, it involves long-term cooperation between public and private actors, where these actors develop mutual products and/or services and in which risks, costs and benefits are shared (Klijn and Teisman, 2003). This collaboration could be approached from a contract-based perspective (Yescombe and Farquharson, 2018), through long-term oriented and contractually secured forms of public-private cooperation. Accordingly, a PPP could be defined as a long-term contract between a private enterprise and a public agency to provide a public service/asset where the private party bears significant risk and management responsibility. This is the definition that is used here.

Literature on PPPs is extensive. One line focuses on the determining factors that explain the use of this strategy and its success (e.g., Sharma, 2012; Panayides et al., 2015; Mota and Moreira, 2015; Boyer and Scheller, 2018; Jiménez et al., 2017; Rosell and Saz-

Carraza, 2020; Palcic et al., 2019; among other). Among the numerous reasons given to explain the use of PPPs, this paper focuses on the political factors. As it is the government (politicians) that take the decisions on how to deliver public services, PPPs depend on the incentives of political leadership and public managers. Adopting a political economy approach, we could therefore expect that political characteristics (such as government ideology and fragmentation, political competition, and the electoral cycle) would affect the decision to use PPPs.

To empirically check this issue, various econometric models are estimated by using a sample of 80 low- and middle-income countries over the period 1995-2017. The results suggest that countries with left-wing governments tend to use PPPs to a greater extent. Moreover, countries with more fragmented governments normally carry out more PPP projects than those whose governments are less fragmented. These results are robust considering not only the number of contractual arrangements but also the total amount of investment commitments.

These findings contribute to previous literature on PPPs, because there are no studies that use a political economy approach in this field of research. Most of literature is focused on aspects of contract design, risk sharing, and analysing the contract performance and benefits and neglects areas such as contract termination and renegotiation (de Castro e Silva Neto et al., 2016). This study highlights the relevance of the political context in which PPP decisions are taken, as scholars have previously evidenced in the case of privatisations (Peña-Miguel and Cuadrado-Ballesteros, 2020b).

Furthermore, researchers have been largely focused on transportation and health sectors (de Castro e Silva Neto et al., 2016), while this study investigates economic infrastructures – i.e., energy, ICT, transport, water and sewerage and municipal solid waste-. Besides, analysing the use of PPP in developing countries is one item on the

contemporary research agenda (Hodge and Greve, 2018). A large part of the literature has explored PPPs in Europe and Asia (de Castro e Silva Neto et al., 2016; Cui et al., 2018), while this study uses a sample of developing countries around the world. There are some previous studies focused on specific African and Asian developing countries, but most of them are case studies¹ (Xiong et al., 2019).

These findings are relevant, not only for specialist academics in PPP, but also for the wider community of scholars working on Politics and International Relations. Our findings show that PPPs are usually implemented by “unlikely” political parties (leftist) rather than by parties the ideologies of which favour such policies (rightist). This supports the Cukierman and Tommasi’s (1998) thesis, suggesting that a right-wing reform may be used the left-wing governments if that reform has desirable outcomes. As a PPP is a mixed model between the private and public sectors, it could support the desires of both the right-wing voters (who supports the market orientation) and the left-wing voters (who support the intervention of public sector in the economy). Following this line of thought, a PPP could be a ‘good’ reform to reconcile parties with ideologies, especially when the government is fragmented and political competition is high, as such our findings show.

The remainder of the paper is structured as follows. The second section reviews the literature and theories on PPP projects from the political economy perspective, and the third proposes the hypotheses. The fourth section describes the methodology in detail, and the fifth comments on the empirical results. The last section offers conclusions as well as the study’s limitations and makes suggestions for future research.

1. THEORETICAL FRAMEWORK

¹ Although case studies allow considering some factors that cannot be empirically operationalised here, they have several limitations, involving the issues of reliability, validity, and generalisability of their results (Hodkinson & Hodkinson, 2001). For more advantages of panel data research, please, see Hsiao (2007).

The concept of PPPs has received increased attention in debates about public financing in Australia and the UK. Indeed, PPPs are politically well accepted and usually operate as private financing initiative (PFI) schemes to attract private funding for the building of new public infrastructures. PFIs were developed by the British government in the 1990s and have gained increasing importance since the beginning of the 2000s (Broadbent and Laughlin, 2003a; 2003b; 2004; Grimsey and Lewis, 2005; Osei-Kyei and Chan, 2015). During the 2000s, countries, such as Australia, Canada, and the United Kingdom, as well as many African, Asian, Middle Eastern, Indian, and Latin American countries, progressively adopted the idea of PPPs (Hodge et al, 2017).

On the one hand, the legacy of the New Public Management (NPM) movement (Hood, 1991; Osborne and Gaebler, 1993) and related attempts to leverage market-based mechanisms to reform government administrations (Delmon, 2011; Grimsey and Lewis, 2007; Savas, 2000) have raised questions about the reasoning behind introducing the private sector into public management. This orientation has resulted in several reforms in public service delivery, such as functional decentralisation, privatisation, outsourcing or externalisation, among others (Behn, 1998; Box et al., 2001; Hodge and Greve, 2017; Sclar, 2000). Among these reforms, PPPs could be considered a governmental entrepreneurial movement (Bloomfield, 2006) where a public partner shares responsibility with a private partner (Hodge, 2006). These management structures aim to improve competitiveness, efficiency, effectiveness and the quality of public services and activities (Appuhami et al., 2011; Benito et al., 2008; Brinkerhoff and Brinkerhoff, 2011; Meira et al., 2010).

As decisions on ‘how’ delivering public services are taken by the government, those decisions depend on the incentives and desires of the political leadership and public

managers. They (politicians) are considered opportunistic agents by the public choice theory (Downs, 1957) and, as such, they act in their own personal interests. Political decision makers not only serve the public but also pursue self-interested actions (Buchanan et al., 1980). They are usually motivated by opportunistic or partisan objectives, such as gaining the greatest number of votes possible (Boardman and Vining, 2012), and this affects public policy and public management decisions.

As the way to deliver public services are decided by politicians, such decisions depend on the incentives of the political leadership for PPP models. Even in cases in which the government is only an enabler and regulator without operative involvement, it remains ultimately responsible (Grimsey and Lewis, 2005). Accordingly, this study focuses on several characteristics of the political and electoral system to explain the use of PPP for providing infrastructures in developing countries. These political factors have already been analysed in the privatisation literature (Opper, 2004; Bortolotti and Pinotti, 2003; Li and Xu, 2002; Peña-Miguel and Cuadrado-Ballesteros, 2020b), but privatisations' findings cannot be extrapolated for PPPs, because but they are different (Konrad, 2018).

Previous literature has suggested the relevance of the institutional context and some political characteristics for PPP decisions. Loxley (2012) concluded that the promotion of PPPs owes much more to ideology than to a rational evaluation of net economic benefit due to the ideological predisposition of some governments towards PPPs. In fact, PPPs are sometimes seen as political symbols ('PPP or nothing': Lonsdale, 2005), being used as a policy strategy to respond to infrastructure shortfalls at a time of budgetary constraints (Linder, 1999; Winch, 2000). However, empirical evidence to support the relevance of political factors in PPP decisions is almost null. Boyer and Scheller (2017) and Mota and Moreira (2015) considered the ideology of the government to explain the

use of PPP for US transportations and the value of PPPs implemented in Europe, respectively. However, they did not statistically relevance to support differences in PPP regarding the political orientation of the government.

2. HYPOTHESES DEVELOPMENT

2.1. The role of political ideology

In the partisan model of Political Business Cycles (PBC), political parties represent the interests of different segments of the electorate. Therefore, they follow policies that are favourable to the segments that support them (Hibbs, 1977). The partisan approach assumes that the preferences and ideology of political parties significantly affect fiscal policy (Alesina and Sachs, 1988). Left-wing parties tend to demonstrate a lack of confidence in the private sector, leading to nationalisations of key industries (Biais and Perotti, 2002; Bortolotti et al., 2003). While left-wing governments tend to favour greater public expenditures with strong preferences for debt financing, right-wing governments are seen to favour less public economic activity. Indeed, right-wing parties favour market solutions. Therefore, it could be expected that PPPs would be more frequently used by the right. Accordingly, the following hypothesis expresses:

H1. PPPs tend to be implemented by right-wing governments to a greater extent than by those with other ideologies.

2.2. Strength of government and political competition

The strength of a government refers to two conditions: the level of political competition and the level of government fragmentation. The former expresses the number of parties in the legislature, and the latter refers to the number of parties in the government. In both cases, the diversity of opinion on a specific subject may hinder the implementation of reforms and public policies. Governments that need the legislative support of other parties

and face substantial competition may find it difficult to achieve consensus regarding the reforms to be made and the most appropriate ways to approach them. In contrast, strong governments that do not need the support of other parties and face little competition may find it easier to achieve consensus on the decision to carry out PPPs.

Furthermore, from a public choice perspective (Buchanan et al., 1980), the extent to which politicians can appropriate political rent (for instance, through PPPs) is determined by the degree of freedom that they enjoy in the political system (Oppen, 2004). The rest of the parties may act as supervisors or controllers, trying to impede actions that result in political rent.

According to these arguments, we propose the following hypotheses:

H2. The strength of the government positively affects PPPs.

H3. Political competition in the legislature negatively affects PPPs.

2.3. Duration of the electoral mandate

PPP projects involve projects with a long-term view (de Jong et al., 2010), so it is more probable that they would be implemented by governments that have been in power for longer periods of time. Warner and Hebdon (2001) observed that politicians who have been in power longer also tend to make greater use of restructuring processes in local governments because of their accumulated experience. Similarly, Obinger et al. (2014) noted that longer-lasting cabinets are better able to realise comprehensive privatisation reforms than cabinets that have been in office for a shorter period. Accordingly, we propose the following hypothesis:

H4. PPPs tend to be implemented by governments that have been in power for longer periods of time.

But even the mandates of politicians that have been in power for a long time come to an end, and politicians' behaviour may be influenced by the proximity of elections. Following the political business cycles (PBC) theory (Nordhaus, 1975; Rogoff and Sibert, 1988), politicians could be considered opportunistic agents, acting in their own interest (to gain power or to retain it). Accordingly, they try to create favourable conditions in pre-election periods to influence voters' opinions, thereby increasing their popularity and the probability of being re-elected. These conditions refer to different reforms and public policies. For instance, Barber and Sen (1986) observed that parties tend to address budgetary discipline in the years immediately following their election because voters may have a negative opinion of controversial policies. For privatisations, Peña-Miguel and Cuadrado-Ballesteros (2020a) found that reforms in Europe tend to be implemented by governments when elections are not imminent, and Opper (2004) noted that large-scale privatisation in transition economies tend to be implemented at the beginning of a mandate.

According to these arguments, we propose the following hypothesis:

H5. The proximity of elections negatively affects PPPs.

3. METHODOLOGY

3.1. Sample

This paper is based on a sample of 80 low- and middle-income countries (see Appendix A) over the period 1995-2017. The sample selection is conditioned by the availability of the data on PPPs and political factors. Data on PPPs have been obtained from the Private Participation in Infrastructure (PPI) database, which is provided by the World Bank's Public Private Partnership Group. This database shows private participation in infrastructure projects in 125 low- and middle-income countries. 43 countries have been

excluded due to scarce observations² in the selected period (1995-2018), and two other countries have been excluded because there are no data on political factors in the Database of Political Institutions (DPI), which is the database providing us with the political variables. DPI contains data on electoral systems, electoral results, and the composition of executive and legislative power (Cruz et al., 2018). The selected variables are described in the next section.

The rest of the socioeconomic factors, apart from the corruption indicators which have been obtained from the Quality of Government (QoG) database (Dahlberg et al., 2020), have been taken from the World Development Indicators (WDI) database.

3.2. Models and variables

The goal of this paper will be addressed through the following model:

$$Projects_{it} = \alpha + \gamma_k * Political\ factors_{k,it} + \beta_j * Controls_{j,it} + \eta_i + \varepsilon_{it} \quad (M1)$$

In Model 1, i and t refer to each country and year, respectively; α , γ and β are the parameters to be estimated; η_i refers to unobservable heterogeneity; and ε_{it} is the classic disturbance term.

Projects refers to infrastructure projects that are owned or managed by private companies. This study includes PPPs in energy (electricity generation, transmission and distribution and natural gas transmission and distribution), information and communications technology (ICT, including land-based and submarine cables, excepting purely private telecoms), transport (airport runways and terminals, railways, toll roads, bridges, highways and tunnels, port infrastructure, superstructures, terminals and channels), the water sector (potable water generation and distribution, sewerage collection and

² These 33 countries present fewer than 4 contracts over the whole period 1995-2018.

treatment) and municipal solid waste (collection and transport, treatment/disposal and integrated systems). More concretely, Model 1 is estimated by using three different variables:

- (i) *PPP* indicates the number of contractual arrangements for public infrastructure projects per year, referring to the year of financial closure (i.e., the year in which the private sponsors agreed to a legally binding agreement to invest funds or provide services).
- (ii) *Payment* stands for the payment commitments to the government (millions of US dollars) to acquire state-owned enterprises or the rights to provide services in a specific area or use the radio spectrum. These expenditures are usually paid through divestiture revenues, license or concession fees or lease payments.
- (iii) *Investment* refers to total investment commitments (millions of US dollars); that is, the sum of the investment in physical assets (i.e., resources the project company commits to investing in expanding and modernising facilities) and payments to the government to acquire state-owned enterprises or the rights to provide services in a specific area or use the radio spectrum (i.e., divestiture revenues, license or concession fees or lease payments).

*Political factors*_k refers to the ideology, strength and experience of the government, the degree of political competition and the electoral cycle. More concretely:

- (i) Political ideology: it refers to government orientation with respect to economic policy. It is represented by the variable *Ideology* that takes the value 1 for governments that are defined as conservative, Christian democratic or right-wing; 2 represents governments that are defined as centrist (e.g., party advocates strengthening private enterprise in a social-liberal context); and 3

for parties that are defined as communist, socialist, social democratic or left-wing.

- (ii) Strength of government: it is represented by the variable *Herf_gov*, that is the Herfindahl Index of the government, calculated as the sum of the squared seat shares of all the parties in the government.
- (iii) Political competition: it is represented by the variable *Votes_gov*, which is the vote share of all the government parties.
- (iv) Government experience: it refers to the duration of the mandate (*Duration_mandate*); that is, the number of years the chief executive has been in office. Years are counted when the executive was in power as of 1 January or was elected but had not taken office as of 1 January. Thus, a “1” is recorded in the year following his/her election.
- (v) Electoral cycle: it is represented by *Exe_elections*, which is a dummy variable that takes the value 1 if executive elections (presidential or parliamentary elections, depending on the system) were held in this year and 0 otherwise.

Finally, the results of Model 1 are controlled by some budgetary and socioeconomic factors (*Control_j*), which have been noted for affecting PPP projects (e.g., Boyer and Scheller, 2018; Sharma, 2012; Rosell and Saz-Carraza, 2020; Palcic et al., 2019; Panayides et al., 2015; Mota and Moreira, 2015; Bayliss and Van Waeyenberge, 2018; Soecipto and Verhoest, 2018; Kawamura, 2020; Jones and Bloomfield, 2020): *Balance* is the general government deficit (% GDP); *GDP* is the GDP per capita in constant 2011 international dollars based on purchasing power parity; *Growth* refers to the GDP (market prices) growth rate; *BCI* is the Bayesian Corruption Index, a composite index of the perceived overall level of corruption, which takes values between 0 and 100 (from the lowest to the highest level of corruption); *Population* counts all residents, regardless of

legal status or citizenship; *Inflation* is the annual percentage change in the consumer price index; *FDI* is the foreign direct investment; *Aid* is the net official development assistance and official aid received (constant 2016 US\$, millions); and *Credit* refers to financial resources provided to the private sector by financial corporations. Year dummies are also included as control variables.

Considering all these variables, Model 1 can be written in the form of the following equations:

$$\begin{aligned}
 \mathbf{PPP}_{it} = & \alpha + \gamma_1 \mathbf{Ideology}_{it} + \gamma_2 \mathbf{Herf_gov}_{it} + \gamma_3 \mathbf{Votes_gov}_{it} + \gamma_4 \mathbf{Duration_mandate}_{it} + \\
 & \gamma_5 \mathbf{Exe_elections}_{it} + \beta_1 \mathbf{Balance}_{it} + \beta_2 \mathbf{GDP}_{it} + \beta_3 \mathbf{Growth}_{it} + \beta_4 \mathbf{BCI}_{it} + \beta_5 \mathbf{Population}_{it} + \\
 & \beta_6 \mathbf{Inflation}_{it} + \beta_7 \mathbf{FDI}_{it} + \beta_8 \mathbf{Aid}_{it} + \beta_9 \mathbf{Credit}_{it} + \eta_i + \varepsilon_{it}
 \end{aligned} \tag{E1}$$

$$\begin{aligned}
 \mathbf{Investment}_{it} = & \alpha + \gamma_1 \mathbf{Ideology}_{it} + \gamma_2 \mathbf{Herf_gov}_{it} + \gamma_3 \mathbf{Votes_gov}_{it} + \gamma_4 \mathbf{Duration_mandate}_{it} + \\
 & \gamma_5 \mathbf{Exe_elections}_{it} + \beta_1 \mathbf{Balance}_{it} + \beta_2 \mathbf{GDP}_{it} + \beta_3 \mathbf{Growth}_{it} + \beta_4 \mathbf{BCI}_{it} + \beta_5 \mathbf{Population}_{it} + \\
 & \beta_6 \mathbf{Inflation}_{it} + \beta_7 \mathbf{FDI}_{it} + \beta_8 \mathbf{Aid}_{it} + \beta_9 \mathbf{Credit}_{it} + \eta_i + \varepsilon_{it}
 \end{aligned} \tag{E2}$$

$$\begin{aligned}
 \mathbf{Payment}_{it} = & \alpha + \gamma_1 \mathbf{Ideology}_{it} + \gamma_2 \mathbf{Herf_gov}_{it} + \gamma_3 \mathbf{Votes_gov}_{it} + \gamma_4 \mathbf{Duration_mandate}_{it} + \\
 & \gamma_5 \mathbf{Exe_elections}_{it} + \beta_1 \mathbf{Balance}_{it} + \beta_2 \mathbf{GDP}_{it} + \beta_3 \mathbf{Growth}_{it} + \beta_4 \mathbf{BCI}_{it} + \beta_5 \mathbf{Population}_{it} + \\
 & \beta_6 \mathbf{Inflation}_{it} + \beta_7 \mathbf{FDI}_{it} + \beta_8 \mathbf{Aid}_{it} + \beta_9 \mathbf{Credit}_{it} + \eta_i + \varepsilon_{it}
 \end{aligned} \tag{E3}$$

3.3. Techniques of analysis

Equation (E1) is initially estimated by using the random-effects Poisson estimator because *PPP* (the dependent variable) refers to the number of occurrences (counts) of an event (here PPP arrangements). However, two specific issues related to the *PPP* variable should be considered. Firstly, it shows an excess of zero counts, as Figure 1 demonstrates. In this situation, a zero-inflated Poisson estimator would be more appropriate since it assumes that the excess zero counts come from a Probit model, and the remaining counts come from a Poisson model. Accordingly, it gives two sets of coefficients (while a

Poisson model gives only one set): estimated coefficients that determine whether the count is zero; and estimated coefficients for the rest of the counts.

Secondly, as will be demonstrated in the next section through the descriptive statistics, the *PPP* variable is over-dispersed, i.e., the variance of *PPP* is much higher than the mean value. In this situation, the negative binomial model is more appropriate than the Poisson model (Cameron and Trivedi, 2010). In the negative binomial model, the count variable is believed to be generated by a Poisson-like process, except that the variation can be greater than that of a true Poisson (i.e., existence of overdispersion). Additionally, as *PPP* is zero-inflated, the zero-inflated negative binomial estimator is used here, which gives two sets of results like the negative Poisson model.

<Insert figure 1 about here>

On the other hand, the dependent variables in equations (E2) and (E3) are continuous (*Investment* and *Payment*, respectively), so the previous estimators are not appropriate in this case. Heckman's two-step model is more appropriate because the decision about PPP investment/payment is made as a set of two decisions. First, the way of providing a specific infrastructure and deciding to use a PPP model or not is made at the political level (decision or pre-tendering stage). If the PPP model is decided on, the administrative level determines the conditions and specifications of the contract, including the amount of investment (tender or ex-ante stage). Accordingly, Heckman's model gives two sets of results, as such the zero-inflated models described previously: estimated coefficients that determine whether PPP arrangements are developed or not ("selection equation") and estimated coefficients for the rest of the values ("outcome equation").

4. RESULTS

4.1. Descriptive statistics

Table 1 shows the descriptive statistics of all the variables that have been described above. Regarding the PPP indicators, the mean value of *PPP* suggests there is an average of 3 to 4 contractual arrangements per public infrastructure project per year, although the number reached its maximum in India in 2012, with 129 contractual arrangements. Payment commitments to governments average 177 million US dollars, and the investment commitments are about 728 million. The maximum value of *Payment* is 29,900.7 million, in Turkey in 2005, and the maximum value of investment commitments is 45,889.82 million, reached by India in 2010. From 2000 to 2012, PPPs had been ascending, as Figure 2 shows, especially between 2004 and 2012. However, *Payment* remains at similar values all through the period. From 2012 on, *PPP* and *Investment* decrease.

Table 1 also shows the mean values of all the political factors (*Ideology*, *Herf_gov*, *Votes_gov*, *Duration_mandate*, and *Exe_elections*). It should be highlighted that the mean value of the Herfindahl index is 0.8, suggesting strong governments, while the average vote share of government parties is 30.31%. The length of the mandate tends to be about 7 or 8 years, although it stretches to more than 40 in Cuba.

<Insert Table 1 about here>

<Insert Figure 2 about here>

Finally, Table 1 also shows the descriptive statistics of the control variables (*Balance*, *GDP*, *Growth*, *BCI*, *Population*, *Inflation*, *FDI*, *Aid*, and *Credit*), and Table 2 shows the bivariate correlations between the explanatory variables used in this study. In general, independent/control variables are not strongly correlated, i.e., in descriptive terms, most of the correlation coefficients are less than 0.5, which is the accepted threshold for multicollinearity problems (Wooldridge, 2010).

<Insert Table 2 about here>

4.2. Empirical findings

Table 3 shows the estimated coefficients of equation (E1) by using the Poisson estimator. At the bottom of the table, the p-value of the likelihood-ratio test of $\alpha = 0$ (comparing the panel estimator with the pooled Poisson estimator) is lower than 0.05, so it is appropriate to use random effects (RE).

The dependent variable of this equation is *PPP*, which counts the number of PPP arrangements. The variable *Ideology* has a positive coefficient and is statistically relevant. This result indicates that the governments with a left-wing orientation tend to use PPPs to a greater extent than governments with other ideologies. Regarding the two variables that represent the political strength of the government (*Herf_gov*) and political competition (*Votes_gov*), both have negative coefficients and are statistically relevant. These findings suggest that PPPs are more often used if the Herfindahl index decreases (representing fragmented governments), and if the vote share of all the parties in the government decreases (representing greater political competition). The coefficients of the variables that represent the duration of the mandate and the election year are not statistically relevant in explaining the number of PPP arrangements.

Focusing on the control variables, the coefficients of *Balance*, *Growth*, *Inflation* and *Aid* are not significant. *GDP*, *BCI*, *Population*, *FDI*, and *Credit* impact positively on the dependent variable, which means that larger countries, in terms of population and economic development, tend to use more PPPs than smaller countries; PPPs tend to be more frequently used in countries with greater levels of corruption; as well as the attractiveness of the national economy and the power and financial capacity of domestic investors are also positively related with the use of PPPs for delivering infrastructures.

<Insert Table 3 about here>

Table 4 shows the estimated coefficients of the variables included in equation (E1) by using both the Poisson (ZIP) and Negative Binomial (ZINB) zero-inflated models. In general, the findings obtained using the two estimators are similar. Furthermore, in both cases we can see two sets of results. Firstly, we find the results for PPP counts and then the results of inflated zeros in *PPP*.

Focusing on *Ideology*, the coefficient is positive and significant in the case of ZIP and ZINB. This means that the number of PPPs tends to increase as government ideology moves towards the left. In addition, the inflated coefficient for *Ideology* suggests that the log odds of an inflated zero decrease when governments demonstrate a left-wing ideological orientation. So, these findings suggest that PPPs are more often used by left-wing governments than governments with other ideologies.

Regarding the strength of the government, the coefficients of *Herf_gov* are negative by using both models (ZIP and ZINB), while they are positive and in the inflated equation; all of them are statistically relevant. These results indicate that the inflated zeros in the *PPP* variable increase when the concentration of the government increases, and the number of PPP projects tends to increase if the concentration of the government lessens. Then, these findings show a positive link between PPPs and the level of fragmentation of the government.

The results suggest a similar conclusion in the case of political competition. *Votes_gov* has negative and significant coefficients in the ZIP and ZINB models, but the coefficients are positive in explaining the inflated zeros of *PPP*. These findings indicate that the number of PPPs tends to increase if the vote share of the government decreases; that is, if political competition grows.

Again, the coefficients of the variables that represent the length of mandate and the election year are not statistically relevant in any equation.

Regarding the control variables, the results are similar to those previously obtained with the Poisson model, i.e., *GDP*, *BCI*, *Population*, *FDI*, and *Credit* show positive coefficients in the first part of the Table. *Growth*, *Inflation* and *Aid* become statistically relevant here but only in the ZIP model; the two first variables are negative, and *Aid* is positive. These coefficients slightly suggest that countries with larger levels of economic growth and inflation tend to use PPPs to a lesser extent, while development assistance and official aid are positively related with PPPs. In the inflated equations (the second part of the Table), the coefficients of mentioned variables are contrary, as it was expected; that is, the inflated zeros in the *PPP* variable increase when *GDP*, *BCI*, *Population*, *Aid*, and *Credit* decreases, and *Inflation* increases; and *FDI* is not statistically relevant in this case.

At the bottom of the Table, we can find several tests. The first Vuong test compares the ZIP model with an ordinary Poisson model. A significant z-test ($p < 0.05$) indicates that the ZIP model is preferred here. The second Vuong test compares the ZINB model with an ordinary negative binomial model. A significant z-test ($p < 0.05$) indicates that the ZINB model is preferred here. Finally, a significant likelihood ratio test for $\alpha = 0$ ($p < 0.05$) indicates that the ZINB model is preferred to the ZIP model because the *PPP* variable is over dispersed.

<Insert Table 4 about here>

Table 5 shows the estimated coefficients of equations (E2) and (E3), in which the dependent variables are *Investment* and *Payment*, respectively. As they are continuous, the Heckman model has been used to obtain the coefficients. The first part of the table (Panel A) shows the results of the “selection equations”, in which the dependent variable

is a dummy that takes the value 1 if at least one PPP project has been developed and 0 otherwise. These equations have been estimated by using a Probit model. The second part of the table (Panel B) shows the results of equations (E2) and (E3), which are the “outcome equations”.

The findings of the logistic equations (Panel A) are similar to those previously obtained, i.e., the probability that the government will deal with PPPs tends to increase if the government has a left-wing orientation, if the concentration (strength) of the government decreases and if political competition increases. In the outcome equation (Panel B), the variable *Ideology* is statistically relevant in explaining investment and payment commitments. It impacts positively on both dependent variables, indicating that commitments increase if the government has a left-wing orientation. The strength of government (*Herf_gov*) is also relevant in both equations, and the two coefficients are negative. These findings indicate that investment and payment commitments increase if the concentration of the government decreases, i.e., if the government is fragmented. The rest of the political factors are not significant in this case.

The control variables have lost their relevance in most of the cases. In Panel A, just *Population*, *FDI* and *Aid* are relevant, indicating that the use of PPPs is more probable in most populated countries, with larger levels of foreign direct investment as well as larger levels of development assistance and official aid. In Panel B, *FDI* is the only control variable that is relevant in both equations, impacting positively on investment and payment commitments.

Finally, the likelihood-ratio test reported at the bottom of the Table refers to the comparison of the joint likelihood of an independent Probit model for the selection equation and a regression model on the observed commitment data with the Heckman model likelihood. The p-value ($p < 0.05$) justifies the Heckman “selection equation”.

<Insert Table 5 about here>

4.3. Robustness checking

This section tests the robustness of previous results for other political variables by changing the variable *Ideology* to *Right*, *Herf_gov* to *Frac_gov*, *Votes_gov* to *Majortiy*, *Duration_mandate* to *Pending_mandate*, and *Exe_elections* to *Leg_elections*. The new variables are described as follows:

- *Right* is a dummy variable that takes the value 1 if governments are defined as conservative, Christian democratic or right-wing and 0 otherwise.
- *Frac_gov* is the probability that two deputies picked at random from among the government parties will be of different parties.
- *Majortiy* is the fraction of seats held by the government.
- *Pending_mandate* is the number of years left in the current term of the chief executive. Only full years are counted, so a 0 is scored in an election year, and n-1 in the year after an election.
- *Leg_elections* is a dummy variable that takes 1 if there was a legislative election in that year and 0 otherwise.

Descriptive statistics of these new variables are included in Table 6 and the empirical findings of all equations are showed in Table 7. Control variables are the same that have been used in previous models, but they have been omitted in Table 7 to avoid lengthy tables.

<Insert Table 6 about here>

<Insert Table 7 about here>

Focusing on equation (E1), the results are in accordance with those previously obtained. More concretely, *Right* impacts negatively on the dependent variable (*PPP*), which suggests that right-wing governments tend to use PPPs to a lesser extent than governments with other ideologies. *Frac_gov* has positive coefficients, suggesting that the number of PPPs is higher if the fragmentation of the government increases. Similarly, *Majority* impacts negatively on the dependent variable, indicating that governments with a larger seat share tend to use PPPs to a lesser extent than others with minority representation. In general, the coefficients of *Pending_mandate* and *Leg_elections* are negative; these results indicate that PPPs tend to be more frequently used when the number of years left for the chief executive in the current term decreases, that is PPPs tend to be implemented at the end of an office term. The coefficients of *Leg_elections* suggest that the number of PPPs decreases in the legislative election years. Thus, linking the effect of these two variables, we could think that PPPs tend to be implemented immediately before elections (maybe as an ‘electoral tool’ to attract votes), and avoided after elections.

The findings obtained for equation (E2) are similar, although some variables (especially *Leg_elections*) have lost significance. Investment commitments tend to increase if governments do not have right-wing ideologies and are fragmented, and if political competition increases. Additionally, these investments tend to be higher immediately before elections. Finally, the political ideology and government fragmentation are the only relevant variables to explain *Payment* (E3), but the results are according to previous ones, regarding investment commitments and the number of PPPs.

5. DISCUSSION AND CONCLUSIONS

The aim of this study is to examine the effect of political factors on the use of PPPs in developing countries, focusing on economic infrastructure sectors. With an empirical analysis over the period 1995–2017, we can state that PPPs are affected by electoral

cycles and different government characteristics, such as political ideology, competition, and fragmentation. Our findings are in line with the main conclusions of Bortolotti et al. (2003) and Peña-Miguel and Cuadrado-Ballesteros (2020b), who noted that privatisation decisions are determined by the interaction of government interests and political structure. Beyond privatisation, this study extends previous evidence on other NPM reforms, such as PPPs.

Concretely, we found that some political characteristics of the governments affect the decision about whether to use the PPP model or not. Firstly, contrary to that was expected, the empirical results suggest that PPPs are more often used by left-wing governments than by governments with other ideologies. This finding is very interesting because literature has generally evidenced that right-wing governments have been more active in introducing private sector reforms in the public ones, such as privatisation (Bortolotti and Pinotti, 2003; Bortolotti et al., 2001; 2003; Obinger et al., 2014; 2016; Bjørnskov and Potrafke, 2011; and so on). However, PPP could be particularly popular for left-wing parties because it is not as “radical” as privatisation, in which ownership, management and control is totally assumed by the private sector. A PPP represents a cooperation between both sectors, so that left-wing governments would prefer to use PPP instead of the most “radical” reform of privatisation. In that way, the incumbents may attract the attention of both groups of voters, that is, conservative voters (who support a market orientation), without forgetting the leftist, who support the intervention of public sector in the economy (Mota and Moreira, 2015).

Then, our finding is according the Cukierman and Tommasi’s (1998) thesis, which explains some policy changes that have been made by “unlikely” political parties rather than by parties the ideologies of which favour such policies. Politicians normally have more and better information than the voters about the outcomes of public policies. So, a

right-wing policy, as the use of PPPs for public service delivery, may be used by the leftist because it has more desirable outcomes. Cukierman and Tommasi (1998) indicate some examples of populist and left-wing governments around the world that have implemented right-wing reforms, such as Argentina under Peronist Menem, Perú under Fujimori, and Bolivia under Estenssoreo, who implemented market-oriented reforms. In Europe, there are also real examples of privatisations that were promoted initially by conservative governments but were continued and accelerated by the successive socialist and liberal governments, as the case of France, Spain, and Italy (Cioffi and Höpner, 2006). Empirically, Roberts and Saeed (2012) and Opper (2004) conclude that privatisations are not totally associated with right-wing governments in Central and Eastern transition economies.

Secondly, this study finds that PPPs tend to be more often used by fragmented governments and when political competition grows. This result is also contrary to that evidenced previously for privatisation reforms (Peña-Miguel and Cuadrado-Ballesteros, 2020b; Bortolotti and Pinotti, 2008), which noted that strong governments with little political competition have a greater predisposition to privatise. Here, PPPs may reconcile the wishes of different political parties since this model may be seen as a true ‘cooperation’ among different ideologies.

Thirdly, we found some evidence on the relevance of the electoral period, although this evidence is slighter. In some equation, the results suggest that PPPs tend to be implemented immediately before elections, and they tend to be avoided after elections, which is contrary to evidence obtained for privatisations (Peña-Miguel and Cuadrado-Ballesteros, 2020b; Opper, 2004). PPPs could be seen as a way of “reconciling” both sectors (public vs. private), and therefore, they gain the support of different parts of the electorate immediately before an election.

We can conclude that multiple political factors affect the decision to use these cooperative structures between the private and public sectors, and so they should be controlled in future research on PPPs. Accordingly, this study contributes to previous literature on PPPs by taking a political economy perspective that has never been used before in this line of research. The empirical findings show the relevance of political frameworks for PPPs, as other authors have noted in the case of privatisation reforms (Oppen, 2004; Bortolotti and Pinotti, 2003; Obinger et al., 2016). This paper responds to the call for further research concerning the use of PPPs in developing countries (Hodge and Greve, 2018) since a large part of the literature has been focused on Europe, the USA, Australia, and China (de Castro e Silva Neto et al., 2016; Cui et al., 2018).

Nevertheless, this study is not free of limitations. Firstly, it would be interesting to consider subsectors of activity and types of PPPs. Here, PPPs are of infrastructures in energy, ICT, municipal solid waste, transport and water and sewerage; and this study considers brownfield projects, greenfield projects, management and lease contracts and divestitures. However, the activity sub-sector and type of PPP has been not controlled in the econometric analyses. Countries compete for private capital and so the relative attractiveness of the country and the sector will be a factor in determining what deals take place. In addition, each country has a set of social relationships that lead to PPPs being implemented including the nature and scope of potential domestic participants (Jones and Bloomfield, 2020). This should be considered in analysing PPPs, but the problem is how to operationalise this factor in an empirical analysis like this. Furthermore, the structure of the PPP deal is also relevant, since investors are more interested in projects that have very secure returns so this will determine the more successful PPPs. We have included some factors that Panayides et al. (2015) suggest as determinants of PPP success. These factors could be enlarged, but the problem again is how to operationalise them for making

empirical analyses. Then, our findings should be cautiously interpreted, bearing in mind these caveats around our study and future research could try to solve these problems.

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APPENDIX A. Countries included in the sample.

1	Albania	31	Honduras	61	Russian Federation
2	Algeria	32	India	62	Rwanda
3	Angola	33	Indonesia	63	Senegal
4	Argentina	34	Iran, Islamic Rep.	64	Sierra Leone
5	Armenia	35	Iraq	65	Somalia
6	Bangladesh	36	Jamaica	66	South Africa
7	Belarus	37	Jordan	67	Sri Lanka
8	Belize	38	Kazakhstan	68	Tajikistan
9	Bolivia	39	Kenya	69	Tanzania
10	Brazil	40	Kyrgyz Republic	70	Thailand
11	Bulgaria	41	Lao PDR	71	Togo
12	Burkina Faso	42	Lebanon	72	Tunisia
13	Cambodia	43	Liberia	73	Turkey
14	Cameroon	44	Madagascar	74	Uganda
15	China	45	Malawi	75	Ukraine
16	Colombia	46	Malaysia	76	Uzbekistan
17	Congo, Rep.	47	Mauritius	77	Venezuela, RB
18	Costa Rica	48	Mexico	78	Vietnam
19	Cuba	49	Mongolia	79	Yemen, Rep.
20	Djibouti	50	Morocco	80	Zambia
21	Dominican Republic	51	Mozambique		
22	Ecuador	52	Myanmar		
23	Egypt, Arab Rep.	53	Namibia		
24	El Salvador	54	Nepal		
25	Gabon	55	Nicaragua		
26	Georgia	56	Nigeria		
27	Ghana	57	Pakistan		
28	Guatemala	58	Peru		
29	Guinea	59	Philippines		
30	Haiti	60	Romania		

Table 1. Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
<i>PPP</i>	3.6147	11.3377	0	129
<i>Investment</i>	728.45	2,886.699	0	45,889.82
<i>Payment</i>	177.1301	1,285.596	0	29,900.7
<i>Ideology</i>	2.2869	0.8887	1	3
<i>Herf_gov</i>	0.8050	0.2553	0.0898	1
<i>Votes_gov</i>	30.3112	32.1797	0	100
<i>Duration_mandate</i>	7.6951	8.1841	1	47
<i>Exe_elections</i>	0.1459	0.3531	0	1
<i>Balance</i>	-2.1319	4.0661	-18.4	39.83
<i>GDP</i>	7190.307	5,505.713	471.2	27,291.04
<i>Growth</i>	4.5291	4.4627	-33.1	54.16
<i>BCI</i>	55.6786	9.0073	22.87	74.12
<i>Population</i>	16.6429	1.4815	12.2403	21.05
<i>Inflation</i>	1.8565	1.1143	-3.2189	8.3297
<i>FDI</i>	3.8770	6.1717	-37.15	103.34
<i>Aid</i>	673.9684	1017.5470	-989.94	24877.53
<i>Credit</i>	33.2267	30.6545	1.27	166.5

Table 2. Bivariate correlations

	<i>Ideology</i>	<i>Herf_gov</i>	<i>Votes_gov</i>	<i>Duration_mandate</i>	<i>Exe_elections</i>				
<i>Ideology</i>	1								
<i>Herf_gov</i>	-0.0003	1							
<i>Votes_gov</i>	0.1053**	0.1228***	1						
<i>Duration_mandate</i>	0.2376***	0.0999***	0.0662**	1					
<i>Exe_elections</i>	-0.0578†	0.0261	-0.0259	0.0137	1				
<i>Balance</i>	0.1471***	0.0218	-0.0049	0.0881**	0.0169	1			
<i>GDP</i>	-0.0744*	-0.0543*	0.0175	-0.0369	-0.0077		1		
<i>Growth</i>	0.1571***	0.0209	0.0262	0.0282	-0.0051			1	
<i>BCI</i>	-0.1666***	0.0001	-0.2681***	-0.0184	0.0715**				1
<i>Population</i>	0.1627***	-0.1922***	-0.1707***	-0.0747**	-0.0269				
<i>Inflation</i>	-0.0112	0.0702	0.0399	-0.0657	0.0365				
<i>FDI</i>	0.0638†	0.076**	0.0746**	-0.0186	0.002				
<i>Aid</i>	0.0887**	-0.0076	-0.0365	-0.0492*	-0.0394†				
<i>Credit</i>	0.093**	-0.0392	0.0719**	-0.0868***	-0.1215***				
	<i>Balance</i>	<i>GDP</i>	<i>Growth</i>	<i>BCI</i>	<i>Population</i>	<i>Inflation</i>	<i>FDI</i>	<i>Aid</i>	<i>Credit</i>
<i>Balance</i>	1								
<i>GDP</i>	0.016	1							
<i>Growth</i>	0.2099***	-0.126***	1						
<i>BCI</i>	0.0841**	-0.2543***	-0.0668**	1					
<i>Population</i>	0.0139	0.0939***	0.0621**	0.0926***	1				
<i>Inflation</i>	0.076	-0.0804**	-0.0581*	0.116***	0.0868***	1			
<i>FDI</i>	0.0714*	-0.0559*	0.068**	-0.0114	-0.2045***	0.0176	1		
<i>Aid</i>	-0.0913**	-0.171***	0.0903***	0.0482*	0.3311***	0.0484†	-0.0284	1	
<i>Credit</i>	-0.1545***	0.3951***	-0.0577*	-0.3223***	0.1875***	-0.2696***	0.0057	-0.0079	1

Notes: *** p<0.001; ** p<0.01; * p<0.05; † p<0.10

Table 3. Results of equation (E1) by using Poisson model

	Coef.	Std. Err.
<i>Ideology</i>	0.1278***	0.0366
<i>Herf_gov</i>	-0.9356***	0.1232
<i>Votes_gov</i>	-0.0026*	0.0013
<i>Duration_mandate</i>	-0.0042	0.0086
<i>Exe_elections</i>	0.0477	0.0603
<i>Balance</i>	-0.0013	0.0201
<i>GDP</i>	0.0233†	0.0123
<i>Growth</i>	-0.0122	0.0090
<i>BCI</i>	0.0426***	0.0111
<i>Population</i>	0.8120***	0.1050
<i>Inflation</i>	-0.0317	0.0392
<i>FDI</i>	0.0467***	0.0129
<i>Aid</i>	-0.0627	0.0523
<i>Credit</i>	0.0172***	0.0026
<i>_cons</i>	-1.6755***	0.1788
LR test of alpha=0		Prob $\geq \chi^2 = 0.000$

Notes: (i) Dependent variable is *PPP* in all equations; (ii) *** is $p < 0.001$, ** is $p < 0.01$, * is $p < 0.05$, † is $p < 0.10$; (iii) Regression includes year fixed effects.

Table 4. Results of equation (E1) by using zero-inflated models

	ZIP model		ZINB model	
	Coef.	Std. Err.	Coef.	Std. Err.
<i>Ideology</i>	0.3757***	0.0289	0.2508**	0.0760
<i>Herf_gov</i>	-0.3166***	0.0755	-1.2969***	0.2131
<i>Votes_gov</i>	-0.0035***	0.0010	-0.0073**	0.0026
<i>Duration_mandate</i>	0.0440	0.0270	0.0576	0.0440
<i>Exe_elections</i>	0.0120	0.0085	0.4119	0.2507
<i>Balance</i>	0.0126	0.0098	0.0288	0.0215
<i>GDP</i>	0.0445***	0.0055	0.1325***	0.0161
<i>Growth</i>	-0.0177*	0.0085	-0.0132	0.0230
<i>BCI</i>	0.0245***	0.0052	0.0293**	0.0101
<i>Population</i>	0.7032***	0.0243	0.0026***	0.0003
<i>Inflation</i>	-0.0761*	0.0328	-0.0665	0.0706
<i>FDI</i>	0.0856***	0.0096	0.0300	0.0211
<i>Aid</i>	0.1448**	0.0449	0.1819	0.1838
<i>Credit</i>	0.0050***	0.0009	0.0039†	0.0023
<i>_cons</i>	-1.3231***	0.0575	-0.9857	0.7292
Equation that determines whether PPP is zero				
<i>Ideology</i>	-0.6530†	0.3493	-1.8970*	0.7884
<i>Herf_gov</i>	0.1020***	0.0284	0.5268**	0.1815
<i>Votes_gov</i>	0.1986**	0.0615	-0.0114	0.0144
<i>Duration_mandate</i>	0.4391	1.0232	0.0405	0.0583
<i>Exe_elections</i>	0.3896	0.4489	0.4784	0.7029
<i>Balance</i>	0.0376	0.0449	0.1105	0.0858
<i>GDP</i>	-0.3045***	0.0595	-0.3146*	0.1538
<i>Growth</i>	0.0563	0.0659	0.0348	0.1421
<i>BCI</i>	-0.0108†	0.0062	-0.0285*	0.0130
<i>Population</i>	-1.4483***	0.2588	-0.2160***	0.0596
<i>Inflation</i>	0.5567*	0.2532	0.5171	0.4805
<i>FDI</i>	-0.0006	0.0403	0.0420	0.0808
<i>Aid</i>	-0.0025***	0.0005	-0.0055**	0.0017
<i>Credit</i>	-0.0133*	0.0064	-0.0292*	0.0139
<i>_cons</i>	1.3265**	0.4070	-1.9536**	0.6837
Vuong test	Prob > z = 0.0000		Prob > z = 0.0001	
LR test test of alpha=0	-		Prob ≥ χ^2 = 0.0000	
Notes: (i) Dependent variable is <i>PPP</i> in all equations; (ii) *** is $p < 0.001$, ** is $p < 0.01$, * is $p < 0.05$, † is $p < 0.10$; (iii) All regressions include year fixed effects.				

Table 5. Results of equations (E2) and (E3)

Panel A. Selection equation (Probit model)				
	Equation (E2)		Equation (E3)	
	Coef.	Std. Err.	Coef.	Std. Err.
<i>Ideology</i>	0.0508***	0.0124	7.6881***	0.0451
<i>Herf_gov</i>	-0.2632**	0.0829	-0.0500***	0.0123
<i>Votes_gov</i>	-0.6277***	0.1363	-0.4300***	0.1117
<i>Duration_mandate</i>	-0.0333	0.0803	-0.5526	0.3615
<i>Exe_elections</i>	-0.0169	0.1820	0.0444	0.1833
<i>Balance</i>	-0.0063	0.0192	-0.0081	0.0192
<i>GDP</i>	-0.0323†	0.0192	-0.0310	0.0192
<i>Growth</i>	-0.0110	0.0230	-0.0063	0.0229
<i>BCI</i>	-0.0048	0.0092	-0.0019	0.0092
<i>Population</i>	0.8811***	0.1049	0.8390***	0.1045
<i>Inflation</i>	-0.3472	0.3549	-0.2573**	0.0821
<i>FDI</i>	0.0392*	0.0175	0.0398*	0.0175
<i>Aid</i>	0.9860***	0.2109	0.0011***	0.0002
<i>Credit</i>	-0.0051†	0.0030	-0.0043	0.0029
<i>_cons</i>	-1.1988***	0.1732	-1.1404***	0.1743
Panel B. Outcome equation (Heckman model)				
	Equation (E2)		Equation (E3)	
	Coef.	Std. Err.	Coef.	Std. Err.
<i>Ideology</i>	1.5553***	0.3759	0.4258**	0.1542
<i>Herf_gov</i>	-4.1511***	1.1602	-1.4278**	0.4638
<i>Votes_gov</i>	-0.0079	0.0132	-0.0789	5.4167
<i>Duration_mandate</i>	0.0544	0.0633	0.0109	0.0262
<i>Exe_elections</i>	0.6084	0.8473	0.0474	0.0407
<i>Balance</i>	0.0483	0.1059	0.0398	0.0437
<i>GDP</i>	0.4386***	0.0836	0.0454	0.0343
<i>Growth</i>	-0.0279	0.1147	-0.0847†	0.0471
<i>BCI</i>	-0.0092	0.0427	-0.0049	0.0175
<i>Population</i>	-0.1260	0.1887	0.0670	0.0769
<i>Inflation</i>	0.1622	0.3605	-0.0015	0.1467
<i>FDI</i>	0.0049***	0.0008	0.7387*	0.3475
<i>Aid</i>	0.0819	0.0983	0.2089	0.3125
<i>Credit</i>	-0.0182	0.0118	-0.0060	0.0048
LR test of rho = 0	Prob ≥ χ^2 = 0.0002		Prob ≥ χ^2 = 0.0067	

Notes: (i) Dependent variable is *Investment* in equation (E2) and *Payment* in equation (E3); (ii) *** is p<0.001, ** is p<0.01, * is p<0.05, † is p<0.10; (iii) All regressions include year fixed effects.

Table 6. Descriptive statistics of ‘robust’ variables

Variable	Mean	Std. Dev.	Min	Max
<i>Right</i>	0.2921	0.4550	0	1
<i>Frac_gov</i>	0.1926	0.2656	0	0.9125
<i>Majority</i>	0.6522	0.2203	0.0316	1
<i>Pending_mandate</i>	2.0889	1.4923	0	6
<i>Leg_elections</i>	0.2135	0.4099	0	1

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Table 7. Robust checking: including interaction term

	Equation (E1) Poisson model		Equation (E1) ZIP model		Equation (E1) ZINB model		Equation (E2) Heckman model		Equation (E3) Heckman model	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<i>Right</i>	-0.1879**	0.0720	-0.3559***	0.0580	-0.0865	0.1276	-2.7052***	0.6875	-0.6642*	0.2863
<i>Frac_gov</i>	0.9535***	0.1179	0.4711***	0.0709	0.6306**	0.2317	3.9446**	1.2976	1.3491*	0.5285
<i>Majority</i>	-0.0321**	0.0123	-1.0760***	0.1459	-1.4614***	0.3672	-5.1760**	1.9761	-0.8369	0.8112
<i>Pending_mandate</i>	-0.0100	0.0180	-0.0868***	0.0164	-0.1053*	0.0428	-0.4362†	0.2476	-0.1274	0.1032
<i>Leg_elections</i>	-0.1434*	0.0580	-0.2869***	0.0557	-0.2748*	0.1378	-0.7039	0.8075	0.3304	0.3369
			Equation that determines whether PPP is zero				Selection equation (Probit model)			
			Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<i>Right</i>			-0.4838	0.4581	-0.9775	0.6902	0.1223	0.1536	0.0769	0.1536
<i>Frac_gov</i>			-1.8656†	1.0244	-0.5364†	0.3072	0.8571*	0.3411	0.9882**	0.3538
<i>Majority</i>			0.1623**	0.0539	0.3999†	0.2411	-0.8257*	0.3994	-0.8863*	0.4015
<i>Pending_mandate</i>			-0.0964	0.1406	-0.4798	0.3568	-0.0380	0.0538	-0.0464	0.0538
<i>Leg_elections</i>			-0.5964	0.5011	-0.2141	0.1313	-0.0799	0.1782	-0.0658	0.1794
Vuong test			Prob > z = 0.0000		Prob > z = 0.0048					
LR test	Prob ≥ χ^2 = 0.0000				Prob ≥ χ^2 = 0.0000		Prob ≥ χ^2 = 0.0090		Prob ≥ χ^2 = 0.0311	

Notes: (i) Dependent variable is *PPP* in equation (E1), *Investment* in equation (E2) and *Payment* in equation (E3); (ii) *** is $p < 0.001$, ** is $p < 0.01$, * is $p < 0.05$, † is $p < 0.10$; (iii) All equations include the control variables described for the Model 1.

Figure 1. Distribution of variable *PPP*

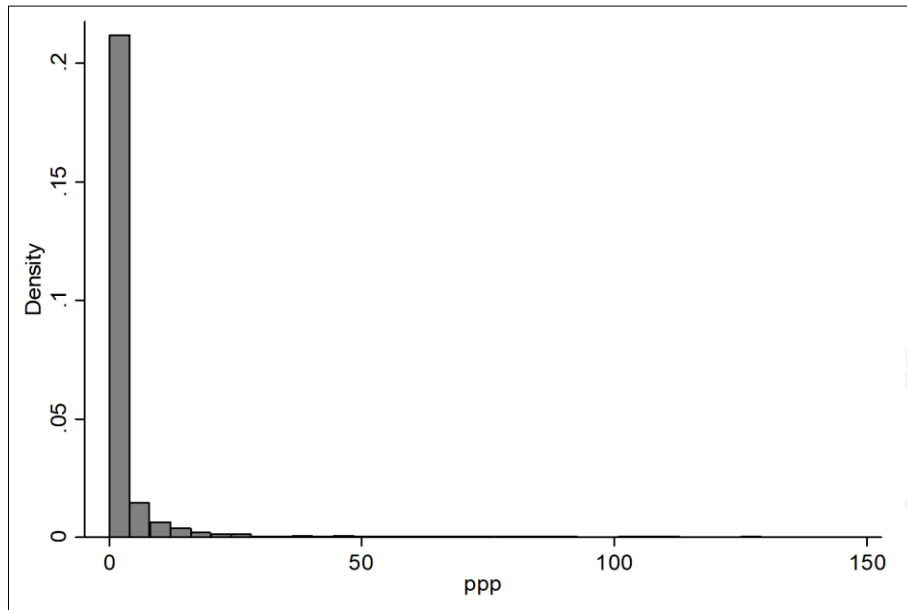


Figure 2. Evolution of variables *PPP*, *Payment* and *Investment*

