

# Institutional Quality, Investment Efficiency and the Choice of Public–Private Partnerships

Hong Nhung Dao

Email: hongnhung.dao@rmit.edu.au

Mobile: +61478919257

Vijaya Bhaskar Marisetty

Email: vijayabhaskar.marisetty@rmit.edu.au

School of Economics, Finance, and Marketing, RMIT University  
Building 80, Level 11, 445 Swanston Street, Melbourne VIC 3000, Australia

November 2016

# Institutional Quality, Investment Efficiency and the Choice of Public–Private Partnerships

## **Abstract**

By using a sample of 625 Public-Private Partnership (PPP) partnering private firms from nine economies (1980-2015) at varying degrees of economic development and PPP market maturity, our study finds that the nature of firms that undertakes PPP investments varies. While private sector firms in economies with low institutional quality opt for PPPs to alleviate capital constraints attributed to underinvestment, those in economies with high institutional quality opting for PPPs to solve the problem of overinvestment caused by abundant cash flow. In the long run, the benefits of lower capital constraints through PPP investments are more significant in the economies with high institutional quality; hence our paper contributes to the extant debatable literature on institution quality by stating that the law-finance-growth hypothesis seem to be predominant over the "political-tie" hypothesis to support for the deduction in capital constraints of private sector firms through PPP investments.

**JEL classification:** G31, G32, G38

**Keywords:** Public-Private Partnerships, institutional quality, investment-cash flow sensitivity.

# Institutional Quality, Investment Efficiency and the Choice of Public–Private Partnerships

## 1. Introduction

Countries around the world are seriously facing with the huge infrastructure gap that hinder the global development. It is estimated that about US\$ 57 trillion needed for infrastructure investment from 2013 to 2030 to keep up with the projected global GDP growth (Dobbs et al., 2013). This amount is 60% more than all the value of investment in infrastructure over the past 18 years. Given the increased public deficit and constraints on commercial debt owing to the financial crisis, Public–Private Partnerships has been increasingly common as the key role to alleviate the deficiencies in infrastructure. However, due to the difference in the origin, growth rate, economic conditions, financial development and liberalization, countries around the world are at the different stages of PPP development. While almost developing economies are in early stage of PPP development with focusing on establish the official PPP legal framework, some other developed economies, such as the United Kingdom or Australia are already at the advanced stage of PPP market maturity with sophisticated models and diverse private funds. However, high economic and financial development sometimes does not ensure to bring the highest benefits to partnering private firms. This results in the massive flow of PPP investments into emerging markets in Latin America and Asia in order to gain governments' promotion. Therefore, whether PPP partnering private sector firms benefit more in higher institutional settings has been increasingly controversial.

When studying how institutional quality influences firm corporate finance, previous literature emphasizes on the traditional "law-finance-growth" nexus of Porta et al. (1997, 1996) in which high institutional quality leads to high financing capabilities. The most supported view in the empirical literature is that the development of financial system and the strong protection of private property rights alleviate capital constraints and enhance external financing (Beck et al., 2002; Claessens and Laeven, 2003; Demirgüç-Kunt and Maksimovic, 1998; Wurgler, 2000, e.g). However, the study of Pistor et al. (2000), one of some initial attempts to investigate this nexus in transition economies, explores that this kind of economies indicate a distinct feature in which political connections may play as an alternative channel to obtain preferential external financing. There has been increasingly numbers of literature supporting this view (Claessens et al., 2008; Cull and Xu, 2005; Faccio et al., 2006; Faccio, 2010; Mian and Khwaja, 2004; Li et al., 2008, e.g.). Therefore, it is difficult to gauge whether the difference on firms' benefits in PPPs across economies are led by the "law-finance-growth" nexus or the "political-tie" hypothesis.

Our study on PPPs provides an ideal setting to disentangle this issue. While literature uses general corporate investment to test firms' capital constraints and the effects of legal framework, PPPs provide a greater platform in which political connection can be more active. There is every chance that private sector firms attempt to secure political ties to grant PPP projects and then be rewarded more with costless pledgable government assets and government guarantee compared with their competing counterparts. Political connections even help them run PPP projects smoothly in the context of large, high-risk infrastructure projects. Moreover, the analysis has been conducted across nine countries at varying degrees of institutional quality, in which either high legal framework or political connections can be activated alternatively; therefore, this allows evaluating whether the "law-finance-growth" nexus or the "political-tie" hypothesis is more dominant.

Owing to the variety of trends in the development of PPPs around the world, the empirical literature on PPPs state that cross-jurisdictional evaluation may be problematic due to the different legal framework and tendering processes, and they evaluate each country separately. Overcoming this difference by controlling for industry and country effects to conduct an inter-country analysis on PPPs, the main aims of our study are to investigate PPP private sector firms' nature and benefits, whether PPPs help private sector firms alleviate capital constraints across economies, and whether there is any relationship between institutional quality and PPP benefits to partnering private sector firms. While previous cross-country PPP analyses focus on PPP deal flows, case studies on PPP project-level performance (Hodge and Greve, 2009), our study, standing from private sector firms' perspective, provides new insights on the benefits of PPPs for partnering private sectors firms. To our best knowledge, this is one of the first empirical cross-country studies on how PPPs influence partnering private sector firms in corporate finance dimension.

By using a sample of 625 PPP partnering private firms in nine economies (ranging from 1980 to 2015) at varying degrees of economic and PPP development, our study finds that the nature of firms that undertakes PPP investments varies. While private sector firms in economies with low institutional quality opt for PPPs to alleviate capital constraints commonly attributed to underinvestment, those in economies with high institutional quality opting for PPPs to solve the problem of overinvestment caused by abundant cash flow. In the long run, the benefits of lower capital constraints through PPP investment are more significant in the economies with high institutional quality; hence the "law-finance-growth" hypothesis seem to be predominant to support for the deduction in capital constraints of private sector firms through PPP investments.

Our study contributes to the extant PPP literature through its unique data set and empirical models on PPP private sector firms in the inter-country analysis. It extends the corporate finance literature on the benefits of these unique contractual agreements for private sector firms and on

gauging the dominance of the "law-finance-growth" nexus over the "political-tie" hypothesis when explaining financing capabilities. Moreover, it provides new guidance on the direction and viability of PPP private sector firms in corresponding PPP market maturity and level of institutional quality. The rest of the paper is organized into four sections. A brief introduction on PPP development stage around the world is presented in Section 2. Literature review and hypotheses development are in Section 3. Section 4 provides the descriptions of the data and the empirical methodology. The empirical results are presented in Section 5. Section 6 concludes.

## **2. Public–Private Partnership Development Stages around the Globe**

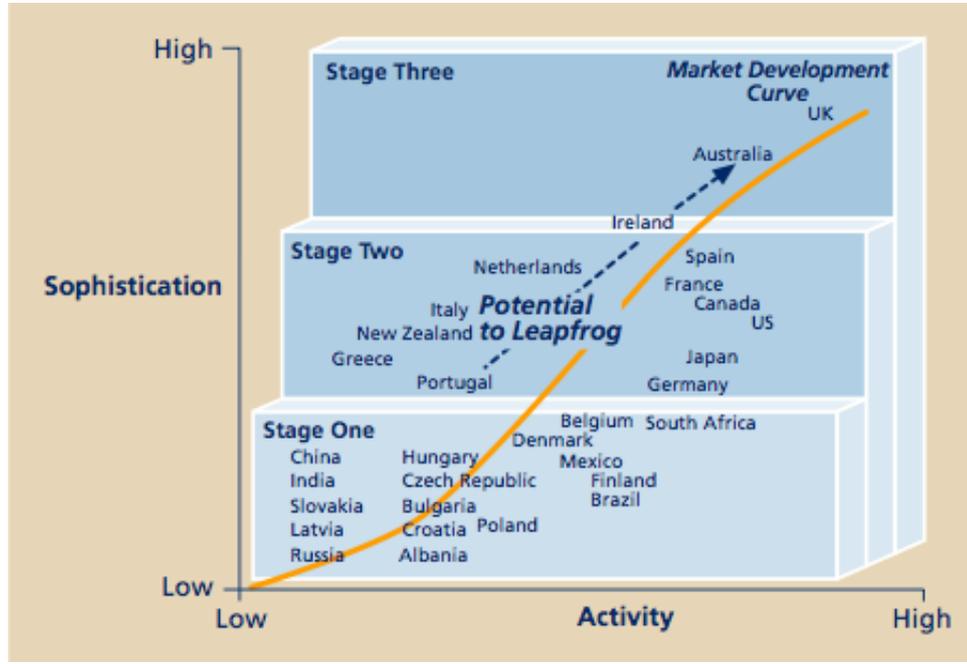
PPPs started in the early 17th century through French concession, strongly developed in the United Kingdom, the United States and throughout the Europe in the 18th and 19th centuries (Grimsey and Lewis, 2004). For developing countries, PPPs emerged lately from the 1990s' and are concentrated in the BRIC emerging economies (Brazil, Russia, India and China) which accounts for about nearly 50 % of total PPP investment in developing countries (World Bank, 2012).

Due to the different origin and growth of PPPs in different economies, countries around the globe are at different stages of PPP sophistication and activities. Eggers and Startup (2006) classify PPP market maturity into three levels depending on the completeness of policy framework, the sophistication of PPP models, the development of PPP marketplace and capital market to finance for PPPs, the expandability of sectors and government support for PPPs. As indicated in Figure 1 adapted from Eggers and Startup (2006), many countries are still at the early stage of PPP market maturity, including BRIC economies, South Africa, Mexico and some countries in the Euro like Belgium, Hungary, Denmark, etc. Accordingly, they are in the time of establishing the policy framework, building PPP marketplace or getting transaction right. Meanwhile, some economies, such as the United States, Canada, Japan, Germany, approached the higher stage, stage two, with new hybrid models, expanded PPP marketplace and new fundings from financial markets. More significantly, the United Kingdom and Australia achieved the most advanced stage of PPP market maturity with the innovative, sophisticated and flexible PPP models, more private equity funds and financial assets to develop (Eggers and Startup, 2006).

However, recently, the global PPP deal flow has not been corresponding exactly with the PPP market development curve. The mature market witnesses the surge in PPP deal in Canada and Australia, go along with the projected next PPP player of the United States KPMG (2015). The main factors driving this trend are strong potential growth, high investment, political stability, and

Figure 1: PPP Market Maturity across Different Economies.

This figure adapted from Eggers and Startup (2006) to illustrate PPP market maturity across different economies depending on the completeness of policy framework, the sophistication of PPP models, the development of PPP marketplace and capital market to finance for PPPs, the expandability of sectors and government support for PPPs.



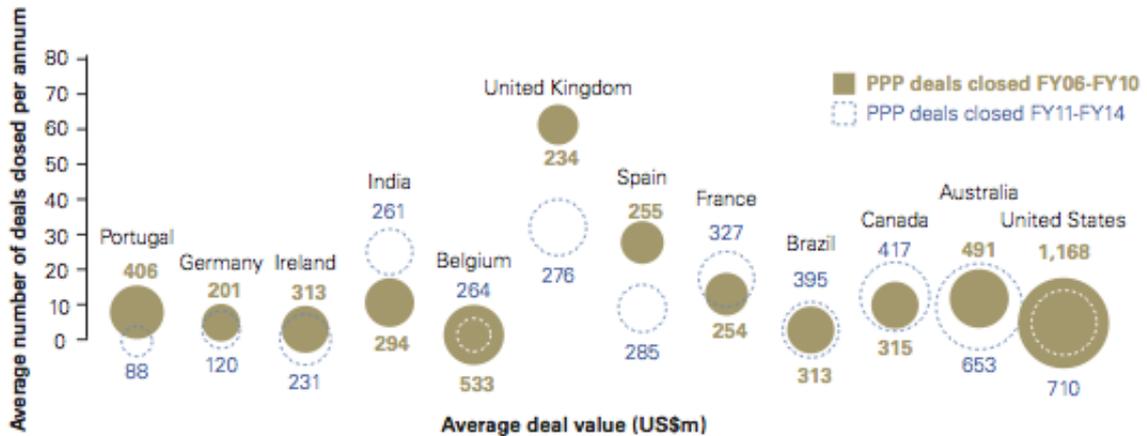
commitment. By contrast, the United Kingdom, the preceding dominator of PPPs, experiences a decline in PPP deal flow due to their previous peak of investment, the anti-private finance options and negative press release (KPMG, 2015). As indicated in Figure 2 adapted from KPMG (2015), the average annual number of PPP deals between 2010 to 2014 is approximately half that of the preceding 5 years. The same plunge of PPP deals can be seen in some countries in the Europe such as Portugal, Spain, and Ireland. By contrast, emerging economies take advantages of this decline to attract seasoned investor from the mature market and experience a surge in PPP deals, with China, India and Brazil are at the top of PPP investment destination. However, KPMG (2015) indicate that the critical issue of government transparency may hinder the PPP development.

### 3. Literature Review and Hypotheses Development

There is a considerable body of literature studying the relationship among law, legal environment, finance and growth. Porta et al. (1996) and Porta et al. (1997) are considered as some of significant authors of the "law and finance" theory when studying the legal determinant of external financing

Figure 2: Change in PPP Deals across Countries from 2006-2010 to 2011-2014

This figure adapted from KPMG (2015) to illustrate the changes of PPP deals in terms of average number of deals per annum and average deal value



Source: IJ Online data (accessed 15 May 2015) and KPMG analysis

across 49 countries. Their findings state that countries with poor investor protection, both in terms of legal rules and the quality of enforcement, have more ownership concentration, smaller capital markets (both equity and debt markets). This lead to fewer chances to access external financing for firms. Also, by classifying countries according to their origin of laws, countries with French civil law have the weakest investor protection and less developed capital markets, compared with the common law countries which has better institutions and less corrupt governments. Demirgüç-Kunt and Maksimovic (1998) study the ability of firms to grow over their internal resources in thirty developed and developing countries and explore that the effectiveness of legal institutions and financial systems matters in securing external financing for firm growth. Wurgler (2000) investigate the relationship between the development of financial markets and capital allocation across 65 countries and state that countries with more informative stock markets, less state ownership and strong protection of minority investors enhance the efficiency of capital allocation. Likewise, Claessens and Laeven (2003) explore that the less developed financial sector and weak property rights reduce firms' access to external financing and hinder asset allocation effectiveness. Accordingly, firms in countries with poor protections of properties tend to allocate more capital to fixed assets rather than intangible assets since weak property rights limit the ability to secure returns of intangible assets from other competitors. Especially, Beck et al. (2002) explain why legal origin and legal environment matters to finance by clearly indicating two channels: the "political" channel

and the "adaptability" channel. The political channel focuses on the relationship between the state rights and the private property rights and indicates the higher degree to which private investors are protected, the better implications on financial development (Beck et al., 2002; Wurgler, 2000). In the other side, the adaptability channel emphasizes on how legal traditions adapt with the changing condition and how they fulfill the gap between economic needs and legal system's capabilities. Therefore, according to Beck et al. (2002), while the political channel focuses on the State power, the adaptability channel enhances financial development by the process of law making and law adjustment to evolving conditions.

While the above studies give an overview of the relationship between law and finance around the globe and indicate how legal framework can determine the capability of achieving external financing, the study of Pistor et al. (2000) is considered as one of some initial attempts to investigate this relationship in transition economies. They explore that transition economies indicate a distinct feature in which the ability to access external financing is not only determined by the strength of private property rights but also by the residual state ownership and political intervention. Allen et al. (2005) studies the "law-finance-growth" nexus in China and explore that the State Sector (State-owned enterprises) and Listed Sector (all firms listed on stock exchanges) follow this nexus, that is poor protection of minority investors leads to weak external financial market and slow firm growth. In contrast, they highlight the special case of the remaining Chinese private firms who may use other financing channels, such as those based on reputation and relationships, to fund for their growth. This may challenge the traditional "law-finance-growth" nexus of Porta et al. (1997, 1996). There is also a growing body of literature indicate how political connections positively influence firms' access to financing especially in developing countries. (Claessens et al., 2008; Cull and Xu, 2005; Faccio et al., 2006; Faccio, 2010; Mian and Khwaja, 2004; Li et al., 2008, e.g.). Based on these studies, it has been argued that in economies with poor protection of private property rights and high corruption, political connections may play as an alternative channel to achieve preferential external financing.

Therefore, it is difficult to tease out whether the benefits of private sector firms across economies, in terms of reducing capital constraints, can be attributed to the traditional "law-finance-growth" nexus of Porta et al. (1997, 1996) in which high institutional quality leads to high financing capability or "political-tie" effects that dominate in low institutional quality where politically connected firms receive preferential financing. Our study on PPPs provide us an ideal setting to test this question. In PPPs, normally, private sector firms has to cooperate directly with the government to develop large, crucial and high-risk infrastructure projects, but compared with their competing counterparts, they are preferred to reward government pledgable assets and government guarantee

in reducing regulator hurdles and demand risk. Therefore, securing a political ties in PPPs can help firms award this beneficial projects from biddings and run them smoothly in the context of high risks. Moreover, prior literature indicates that the benefits of political connections for firms are more prevalent in less developed and high corrupt countries Chen et al. (2010); Faccio et al. (2006), and even sometimes political ties do not work in high developed countries with low lobby activities (Gray et al., 2014). Therefore, by comparing the differences between PPP firms and their non-PPP competing counterparts across economies (developed or emerging), with distinct institutional quality (high or low), our study may clarify whether the "law-finance-growth" hypothesis or the "political-tie" hypothesis is more dominant.

The previous literature on the relationship between institutional quality and PPPs focuses on discovering what factors associated with institutional quality driving the choice of PPP projects and ensure their success; therefore, their findings are based on the country-level analyses. For example Hovakimian (2009) studies the determinants of Public-Private Partnerships in developing countries between 1990 and 2003 based on the World Bank' Private Participation in Infrastructure (PPI) database. They explore that higher institutional quality, such as stable, less corrupt macro economy and effective rule of laws results in more PPP projects. In other research, (Bing et al., 2005; Chan et al., 2010; Hwang et al., 2013; Zhang, 2005, e.g) identify the critical success factors for PPPs that associated with institutional quality, such as political stability, government support and reasonable legal framework. Our study concentrates on firm-level analyses, in other side, aims to explore how institutional quality can bring benefits to partnering private sector firms. Our hypothesis follows the traditional law finance theory by (Porta et al., 1996, 1997, eg) to expect a positive relationship between legal environment and capability of accessing external financing.

**Research question:** Is there any relationship between institutional quality and PPP benefits to partnering private sector firms?

**Hypothesis 1.** *The benefits of lower capital constraints of partnering private sector firms through PPP investments are more significant in matured economies with better institutional quality.*

**Hypothesis 2.** *The benefits of increasing partnering private sector firms' value through PPP investments are more significant in matured economies with better institutional quality.*

## 4. Data and Methodology

### 4.1. Data

Our cross-country sample contains PPP-partnering private sector firms in nine economies, including five developed countries (namely the United Kingdom, Australia, Canada, the United States and Japan) and four emerging developing countries (namely China, India, Brazil and Russia). Nine countries are also classified into three groups based on PPP market maturities Eggers and Startup (2006). Accordingly, as can be seen in Figure 1, the high mature PPP markets include the United Kingdom and Australia, the medium mature PPP markets comprise the United States, Canada and Japan and four BRIC emerging economies are in the low mature PPP markets <sup>1</sup>. The choice of nine economies ranging over all three level of market maturities is to ensure the variation of institutional quality in our sample. Moreover, the nine countries are top leading markets for PPPs and truly representative of the main trends in the recent global infrastructure market (KPMG, 2015). They include the decline after peaking in the formerly leading and traditional PPP market (the UK), the high level of PPP investments in the context of political stability and strong political commitment (in the US, Canada, Australia and Japan) and especially the rapid emergence of PPP investment in BRIC emerging markets (Brazil, Russia, India and China) to fulfill the changing investment flow of foreign investors and enormous economic growth.

Table I and Figure B1 <sup>2</sup> report the number of PPP-partnering private sector firms for each country and each industry in my sample. To obtain the data, we integrate several sources, including the database on PPP projects and PPP private sector firms for each country <sup>3</sup>, the stock exchanges' websites and Datastream to filter out financial or non-listed firms. Consequently, the figure for the listed and non-financial firms are reported in Panel A of Table I and Figure B1. As it can be seen, India and China are the two countries have the top numbers of firm-year observations, accounting for about 34% and 27% of total sample. This followed by Brazil and Japan with each country accounting for about 9% of total sample. Panel B of Table I and Figure B1 reports the figure for PPP private sector firms by industry. The industry classification is based on the FTSE/Dow Jones Industrial Classification Benchmark (ICB) in Datastream. As it can be seen, the construction and material industry has the highest number of PPP firm-year observations, following by the electricity and the gas water industries.

---

<sup>1</sup>See Eggers and Startup (2006) for the detail criteria to classify PPP market maturity

<sup>2</sup>See in Appendix B

<sup>3</sup>See Table B2 of Appendix B for more details

Table I: PPP Listed Private Sector Firms by Countries and Industries

	Australia	The UK	The US	Canada	Japan	China	India	Brazil	Russia	Total
<b>Panel A: PPP listed nonfinancial firms</b>	<b>17</b>	<b>27</b>	<b>35</b>	<b>28</b>	<b>57</b>	<b>169</b>	<b>215</b>	<b>58</b>	<b>19</b>	<b>625</b>
<b>Panel B: Industries</b>										
Alternative energy						2				2
Automobile and parts					1					1
Chemical					1		2			3
Construction and materials	8	10	12	16	16	21	110	1		194
Electricity		6		2	5	32	68	18	8	139
Electronic and electrical equipments				1	3	1				5
Fixed line telecommunication				1			6	2	1	10
Food and drug retailers			1							1
Food producers						3	3	4		10
Gas water and multiutilities		3	7	1	1	40				52
General industry					2	18		6		26
Household goods and home construction					1					1
Industrial engineering					16	2	4			22
Industrial metal and mining					4		6	9	2	21
Industrial transportation	3		5		1	10				19
Leisure goods							2			2
Mining	1						1	7	1	10
Mobile telecommunication							3			3
Oil and gas proceducers							2	2	7	11
Oil equipment and services			1	1		10				12
Personal goods					1	2	2	1		6
Pharmaceutical biotechnology							2			2
Real estate investments and services	5					13				18
Software and computer services					1					1
Supported services		8	4	1	2	9	2			26
Technology hardware and equipment						2	2			4
Travel and leisure			1			4				5

## 4.2. Descriptive Analysis

Tables II and III report the results of descriptive analyses to compare PPP private sector firms and their non-PPP competing counterparts. Tables IV and V emphasize PPP private sector firms only by comparing them in different kinds of economies (Developed or emerging economies) and different PPP market maturity (High, medium or low maturity). The analyses are conducted in the PPP years and 5-year post-PPP period. The main aims are to explore how the treatment and control groups vary in the PPP investment years and the post-PPP investment period and whether the variation explains the cross-country and cross-market maturity differences.

In the PPP investment years, as shown in Panel A of Table II, private sector firms that opt for PPPs have higher *Size*, *Age*, *Tobin's q*, *Sale growth* compared with their counterparts. This indicates that, for all sample, larger, older, better-valued firms with high investment opportunities firms opt for PPPs. However, regarding PPP market maturity, as highlighted in Panels C,D,E, the nature of PPP private sector firms varies across different market maturity. In the developed economies with the high mature PPP market, as can be seen in Panel C, larger and older firms with higher investment, higher cash flow choose to invest in PPP projects. In the developed economies with the medium mature PPP market, as shown in Panel D, there is a slight difference between PPP and non-PPP firms in terms of *Capex/sales*, indicating that firms in medium mature market with less investment intensity opt for PPPs. Meanwhile, in developing economies with low mature market, as it can be seen in Panel E, larger firms with high investment opportunities opt for PPPs. We next turn to compare PPP firms in different economies and different PPP market maturity in the PPP investment years, as can be seen in Table IV to confirm the variation of PPP private firms. Overall, as can be seen clearly in Panels A,B,C of Table IV, compared with PPP firms in the low mature PPP markets, those in the higher mature market are larger and older, but has fewer investment opportunities (witnessed by lower *Tobin's q* and lower *Sales growth*). These results initially highlight the nature of private sector firms opting for PPPs and how they align with the maturity of PPP environment. While in high mature market and highly developed economies, firms with possible better financial position are awarded with PPP projects, low mature market award PPP projects to firms that have better investment opportunities.

We now turn to the post-PPP analyses. Table III reports the results when comparing PPP firms and their competing non-PPP firms, whereas Table V explains the variation of PPP firms across different economies. In the developed economies with the high mature PPP market, compared with their non-PPP firms, PPP private sector firms still maintain better financial position (higher *Investment*, *Cash flow*, *Size*, and *Age*), and they are even rewarded with higher leverage after

participating in PPP projects. Meanwhile, in the developing economies with the low mature PPP market, PPP private sector firms are rewarded with higher *Sales growth* compared with their competing non-PPP firms, which have not been seen at the starting time of PPP investments. However, a newly added feature of PPP firms in the low mature market after participating in PPPs is the lower leverage compared with their counterparts. Given that *Leverage* is calculated by total debt divided by total assets, the lower leverage of PPP firms may be attributed to changes in debt or equity. We investigate again the original data of private sector firms in the PPP investment years and the post-PPP period and explore that, both debt and equity are increasing in the volume after participating in PPPs; however, the growth rate of equity are higher than those of debt, resulting lower leverage for PPP private sector firms. Sometimes, the higher growth of equity may be attributed to the increase in government ownership in private sector firms as a consequence of PPPs. Therefore, in general, PPP investments still help private sector firms increase external financing in the volume in the low mature market. Moreover, when comparing PPP firms among different economies, as shown in Table V, the most newly highlighted feature is that PPP private sector firms in the higher mature PPP market can obtain higher leverage compared with those in the low mature PPP market. This result has not seen at the time of PPP investments. In summary, from descriptive analyses, while PPP investments in low mature markets increase the growth in sales of PPP private sector firms in comparison with their control group, the higher mature market indeed provides PPP firms with greater opportunities to increase their leverage.

Table VI reports the mean differences of institutional quality in different economies (developed-emerging) and in different market maturity. These analyses are conducted at the time of PPP investment and in the 5-year post-PPP period. The results indicate that developed economies have higher institutional quality than emerging economies. Also, countries in the higher PPP maturity market enjoy higher institutional quality. This is evident from the positive and significant mean differences between the high and low, medium and low, high and medium mature markets.

Table II: Descriptive Analysis - PPP &amp; Non-PPP firms in the PPP year

This table provides the mean firm-level characteristics of the sample firms, the difference of means between PPP firms and non-PPP firms along with t-test. The mean value is reported in the years when firms have PPP projects. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation, and amortization, divided by the previous years' fixed assets. *Size* (firm size) is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firm's incorporation. *Tobin's q* is measured by the market to book value of total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

Country	Variable	PPP	Non-PPP	Difference	t-test	PPP	N Non-PPP
Panel A: All sample	Investment	0.8402373	0.7519943	0.088243	1.5598	583	511
	Cash flow	0.7511221	0.5803847	0.1707374	0.5886	581	510
	Size	6.245427	6.10399	0.141437	3.0417***	614	521
	Age	12.10261	11.24283	0.85978	1.7271*	614	523
	Tobin's q	1.705843	1.393937	0.311906	1.9245*	556	453
	Capex/sales	0.6805595	0.3083223	0.3722372	1.1479	591	502
	Sale growth	46.67976	28.97135	17.70841	2.4019**	564	482
	Leverage	0.4227809	0.4102745	0.0125064	0.851	602	505
Panel B: Developed economies	Investment	0.566874	0.2310262	0.3358478	1.3747	157	153
	Cash flow	0.802302	0.4764887	0.3258133	1.9606*	157	153
	Size	6.474473	6.283819	0.190654	2.3498**	157	153
	Age	20.14013	17.46405	2.67608	2.6234***	157	153
	Tobin's q	1.2678	1.359428	-0.091628	-1.4735	148	144
	Capex/sales	0.064449	0.1337419	-0.0692929	-1.874*	153	150
	Sale growth	9.599795	5.363962	4.235833***	1.0936	150	147
	Leverage	0.4134526	0.4290513	-0.0155987	-0.5739	152	150
Panel C: Developed economies -High maturity	Investment	0.4005575	0.2219545	0.178603	1.8042*	43	43
	Cash flow	1.61392	0.6117533	1.0021667	2.2118**	43	43
	Size	6.449651	5.914947	0.534704	4.4035***	43	41
	Age	18.46512	12.2093	6.25582	3.8334***	43	43
	Tobin's q	1.419072	1.513755	-0.094683	0.8431	41	37
	Capex/sales	0.0723433	0.1918816	-0.1195383	-1.0676	41	41
	Sale growth	11.05885	10.14032	0.91853	0.1399	41	40
	Leverage	0.398661	0.3543829	0.0442781	0.9033	41	41
Panel D: Developed economies -Medium maturity	Investment	0.6296074	0.2345724	0.395035	1.1749	114	110
	Cash flow	0.4961655	0.4236126	0.0725529	0.5134	114	110
	Size	6.483836	6.421308	0.062528	0.6312	114	110
	Age	20.77193	19.51818	1.25375	1.0358	114	110
	Tobin's q	1.209836	1.306062	-0.096226	1.3151	107	107
	Capex/sales	0.0615592	0.1118728	-0.0503136	-1.7146*	112	109
	Sale growth	9.184112	7.298924	1.885188	0.5755	109	107
	Leverage	0.4189162	0.4571376	-0.0382214	-1.1855	111	109
Panel E: Emerging economies -Low maturity	Investment	0.9409839	0.5292217	0.4117622	1.1926	426	358
	Cash flow	0.732171	0.6249116	0.1072594	0.2678	424	357
	Size	6.16674	6.0306	0.13614	2.458**	457	370
	Age	9.341357	8.67027	0.671087	1.5263	457	370
	Tobin's q	1.864742	1.41002	0.454722	2.0026**	408	309
	Capex/sales	0.8988837	0.3827174	0.5161663	1.1421	438	352
	Sale growth	60.11452	39.33041	20.78411	2.0643**	414	335
	Leverage	0.4259318	0.4023406	0.0235912	1.3492	450	355

Table III: Descriptive Analysis - PPP &amp; Non-PPP firms in the 5-year post-PPP period

This table provides the mean firm-level characteristics of the sample firms, the difference of means between PPP firms and non-PPP firms along with t-test. The mean value is reported in 5-year post-PPP period. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation, and amortization, divided by the previous years' fixed assets. *Size* (firm size) is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firm's incorporation. *Tobin's q* is measured by the market to book value of total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

Country	Variable	PPP	Non-PPP	Difference	t-test	PPP	N Non-PPP
Panel A: All sample	Investment	0.4724642	0.5202707	-0.0478065	-0.3428	746	733
	Cash flow	0.6355231	0.5516761	0.083847	0.8572	746	733
	Size	6.438826	6.212828	0.225998	4.869***	750	733
	Age	16.34862	15.004	1.34462	2.8619***	763	750
	Tobin's q	1.168452	1.27171	-0.103258	-3.0302***	708	703
	Capex/sales	0.1505604	0.3639687	-0.2134083	-1.2978	737	717
	Sales growth	24.92773	15.60091	9.32682	1.9979**	728	718
	Leverage	0.4119873	0.4181339	-0.0061466	-0.4333	746	733
Panel B: Developed economies	Investment	0.5312635	0.5477557	-0.0164922	-0.078	471	477
	Cash flow	0.700849	0.5262917	0.1745573	1.4801	471	476
	Size	6.495993	6.263608	0.232385	4.5208***	473	477
	Age	20.13389	18.52807	1.60582	2.799***	478	481
	Tobin's q	1.215036	1.288481	-0.073445	-2.2714**	450	472
	Capex/sales	0.0816148	0.1204551	-0.0388403	1.5945	464	471
	Sales growth	10.88935	8.55149	2.33786	1.3057	459	470
	Leverage	0.4280115	0.4089943	0.0190172	1.1024	469	475
Panel C: Developed economies -High maturity	Investment	0.5029815	0.1928825	0.310099	2.4991**	118	117
	Cash flow	1.297826	0.2731291	1.0246969	3.217***	118	117
	Size	6.391153	5.711354	0.679799	8.174***	119	117
	Age	16.04918	12.58333	3.46585	3.7663***	122	120
	Tobin's q	1.332115	1.319529	0.012586	-0.2432	117	118
	Capex/sales	0.1455109	0.182265	-0.0367541	-0.489	113	116
	Sales growth	11.12591	7.241955	3.883955	1.5832	111	116
	Leverage	0.4333949	0.3412407	0.0921542	2.3427**	117	118
Panel D: Developed economies -Medium maturity	Investment	0.5407176	0.6630895	-0.1223719	-0.4402	353	360
	Cash flow	0.501293	0.6087988	-0.1075058	-0.9388	353	359
	Size	7.787405	7.678829	0.108576	0.9646	354	360
	Age	21.53371	20.50416	1.02955	1.5739	356	361
	Tobin's q	1.1739	1.278132	-0.104232	-2.6445***	333	354
	Capex/sales	0.0610442	0.1002581	-0.0392139	-1.8671*	351	355
	Sales growth	10.81368	8.980603	1.833077	0.8204	347	354
	Leverage	0.4262222	0.4313891	-0.0051669	-0.2749	352	357
Panel E: Emerging economies -Low maturity	Investment	0.3717571	0.4690584	-0.0973013	-1.0587	275	256
	Cash flow	0.5236376	0.5988751	-0.0752375	-0.4348	275	256
	Size	6.341209	6.11821	0.222999	2.4607**	277	256
	Age	10	8.702602	1.297398	2.8667***	285	269
	Tobin's q	1.087201	1.237442	-0.150241	-1.9496*	258	231
	Capex/sales	0.2677427	0.8302081	-0.5624654	-1.2273	273	246
	Sales growth	48.74099	26.34065	22.40034	1.8239*	270	245
	Leverage	0.384836	0.4349606	-0.0501046	-2.032**	277	258

Table IV: Descriptive Analysis - PPP firms in different economies in the PPP year

This table provides the mean firm-level characteristics of the sample firms, the difference of means in PPP firms in different economies (developed - emerging) and in different market maturity (high-medium-low). The mean value is reported in the years that PPP engaging in PPP investments. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation and amortization, divided by the previous years' fixed assets. *Size* (firm size) is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firm's incorporation. Tobin's q is measured by market to book value of total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. \*\*\*,\*\*,\* indicate significant at 1%, 5% and 10% level.

Panel A	Developed	Emerging	Difference	t test	N	
					Developed	Emerging
Investment	0.566874	0.9409839	-0.3741099	-0.7612	157	426
Cash flow	0.802302	0.732171	0.070131	0.1182	157	424
Size	6.474473	6.16674	0.307733	4.15***	157	457
Age	20.14013	9.341357	10.798773	15.7729***	157	457
Tobin's q	1.2678	1.864742	-0.596942	-1.8561*	148	408
Capex/sales	0.064449	0.8988837	-0.8344347	-1.234	153	438
Sale growth	9.599795	60.11452	-50.514725	-3.6968***	150	414
Leverage	41.34526	42.59318	-1.24792	-0.5836	152	450
Panel B	High maturity	Low maturity	Difference	t test	N	
					High	Low
Investment	0.4005575	0.9409839	-0.5404264	-0.6009	43	426
Cash flow	1.61392	0.732171	0.881749	0.7813	43	424
Size	6.449651	6.16674	0.282911	2.1807**	43	457
Age	18.46512	9.341357	9.123763	8.3788***	43	457
Tobin's q	1.419072	1.864742	-0.44567	-0.7299	41	408
Capex/sales	0.0723433	0.8988837	-0.8265404	-0.6342	41	438
Sale growth	10.7049	60.11452	-49.40962	-1.8972*	41	414
Leverage	39.8661	42.59318	-2.72708	-0.7463	41	450
Panel C	Medium maturity	Low maturity	Difference	t test	N	
					Medium	Low
Investment	0.6296074	0.9409839	-0.3113765	-0.54	114	426
Cash flow	0.4961655	0.732171	-0.2360055	-0.3419	114	424
Size	6.483836	6.16674	0.317096	3.7039***	114	457
Age	20.77193	9.341357	11.430573	14.6999***	114	457
Tobin's q	1.209836	1.864742	-0.654906	-1.7323*	107	408
Capex/sales	0.0615592	0.8947979	-0.8332387	-1.0593	112	438
Sale growth	9.184112	60.11452	-50.930408	-3.1789***	109	414
Leverage	41.89162	42.59318	-0.70156	-0.2891	111	450
Panel D	High maturity	Medium maturity	Difference	t test	N	
					High	Medium
Investment	0.4005575	0.6296074	-0.2290499	-0.4325	43	114
Cash flow	1.61392	0.4961655	1.1177545	3.4045***	43	114
Size	6.449651	6.483836	-0.034185	0.2719	43	114
Age	18.46512	20.77193	-2.30681	-1.4581	43	114
Tobin's q	1.419072	1.209836	0.209236	3.1566***	41	107
Capex/sales	0.0723433	0.0615592	0.0107841	0.61	41	112
Sale growth	10.7049	9.184112	1.520788	0.3086	41	109
Leverage	39.8661	41.89162	-2.02552	-0.4666	41	111

Table V: Descriptive Analysis - PPP firms in different economies in the 5-year post-PPP period

This table provides the mean firm-level characteristics of the sample firms, the difference of means in PPP firms in different economies (developed - emerging) and in different market maturity (high-medium-low). The mean value is reported in the 5-year post-PPP period. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation and amortization, divided by the previous years' fixed assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. Age is measured from the year of firm's incorporation. *Tobin's q* is measured by market to book value of total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

Panel A	Developed	Emerging	Difference	t test	N	
					Developed	Emerging
Investment	0.5312635	0.3717571	0.1595064	1.6059	471	275
Cash flow	0.700849	0.5236376	0.1772114	1.3771	471	275
Size	6.495993	6.341209	0.154784	2.4412**	473	277
Age	20.13389	10	10.13389	17.258***	478	285
Tobin's q	1.215036	1.087201	0.127835	3.9422**	450	258
Capex/sales	0.0816148	0.2677427	-0.1861279	-7.4495***	464	273
Sales growth	9.705306	39.27088	-29.565574	-6.1438***	451	270
Leverage	42.80115	38.4856	4.31555	2.1511**	469	277
Panel B	High maturity	Low maturity	Difference	t test	N	
					High	Low
Investment	0.5029815	0.3717571	0.1312244	1.2573	118	275
Cash flow	1.297826	0.5236376	0.7741884	3.6128***	118	275
Size	6.391153	6.341209	0.049944	0.5254	119	277
Age	16.04918	10	6.04918	8.7502***	122	285
Tobin's q	1.332115	1.087201	0.244914	0.6785	117	258
Capex/sales	0.1455109	0.2677427	-0.1222318	-2.4597**	113	273
Sales growth	11.12591	48.74099	-37.61508	-2.114**	111	270
Leverage	43.33949	38.4856	4.85389	1.7059*	117	277
Panel C	Medium maturity	Low maturity	Difference	t test	N	
					Medium	Low
Investment	0.5407176	0.3717571	0.1689605	1.5831	353	275
Cash flow	0.501293	0.5236376	-0.0223446	-0.2163	353	275
Size	6.531236	6.341209	0.190027	2.7074***	354	277
Age	21.53371	10	11.53371	18.9341***	356	285
Tobin's q	1.1739	1.087201	0.086699	2.506**	333	258
Capex/sales	0.0610442	0.2677427	-0.2066985	-9.4525***	351	273
Sales growth	10.81368	48.74099	-37.92731	-3.7029***	347	270
Leverage	42.62222	38.4856	4.13662	2.1139**	352	277
Panel D	High maturity	Medium maturity	Difference	t test	N	
					High	Medium
Investment	0.5029815	0.5407176	-0.0377361	-0.2323	118	353
Cash flow	1.297826	0.501293	0.796533	3.9925***	118	353
Size	6.391153	6.531236	-0.140083	1.7483*	119	354
Age	16.04918	21.53371	-5.48453	6.1707***	122	356
Tobin's q	1.332115	1.1739	0.158215	4.068***	117	333
Capex/sales	0.1455109	0.0610442	0.0844667	2.8356***	113	351
Sales growth	11.12591	10.81368	0.31223	0.0921	111	347
Leverage	43.33949	42.62222	0.71727	0.2269	117	352

Table VI: Descriptive Analysis for Institutional Quality Variables

This table provides the mean differences of Institutional Quality in different economies (developed - emerging) and in different market maturity (high-medium-low). The mean value is reported in the years that PPP engaging in PPP investments and in the 5-year post-PPP period.

Variables	PPP year					5-year post-PPP						
	Developed	Emerging	Difference	t test	N	Developed	Emerging	Difference	t test	N		
Political stability	0.8297689	-0.7658878	1.5956567	57.55936	313	0.845164	-0.575837	1.421001	67.85449	898		
Regulatory quality	1.426314	-0.2300726	1.6563866	98.08174	316	1.376713	-0.113277	1.48999	86.4185	898		
Control of corruption	1.699255	-0.4400552	2.1393102	115.8307	316	1.661531	-0.434539	2.09607	97.3373	898		
Freedom from corruption	1.416825	-0.8831098	2.2999348	122.5817	315	1.403452	-0.932852	2.336304	114.9516	959		
Government effectiveness	1.603324	-0.0438553	1.6471793	148.0444	316	1.592429	-0.1519009	1.7443299	152.7045	898		
Rule of law	1.516017	-0.2327764	1.7487934	100.896	316	1.480964	-0.3905557	1.8715197	136.6307	898		
	High	Low	Difference	t test	High	Low	High	Low	Difference	t test	High	Low
Political stability	0.7006517	-0.7658878	1.4665395	28.59062	83	796	0.806993	-0.575837	1.38283	38.8798	228	541
Regulatory quality	1.755208	-0.0438553	1.7990633	115.5849	86	796	1.703593	-0.113277	1.81687	85.08411	228	541
Control of corruption	1.939005	-0.4400552	2.3790602	94.93834	86	796	1.969899	-0.434539	2.404438	87.26576	228	541
Freedom from corruption	1.753488	-0.8831098	2.6365978	112.2986	86	820	1.7965	-0.932852	2.729352	122.8312	240	554
Government effectiveness	1.708142	-0.2300726	1.9382146	80.97534	86	796	1.703593	-0.113277	1.81687	85.08411	228	541
Rule of law	1.689979	-0.2327764	1.9227554	63.16707	86	796	1.699775	-0.3905557	2.0903307	98.12176	228	541
	Medium	Low	Difference	t test	Medium	Low	Medium	Low	Difference	t test	Medium	Low
Political stability	0.8763634	-0.7658878	1.6422512	52.52135	230	796	0.858154	-0.575837	1.43399	63.25903	670	541
Regulatory quality	1.546532	-0.0438553	1.5903873	130.6183	230	796	1.536164	-0.151901	1.688065	140.6429	670	541
Control of corruption	1.609609	-0.4400552	2.0496642	100.875	230	796	1.556594	-0.434539	1.991133	87.06372	670	541
Freedom from corruption	1.290393	-0.8831098	2.1735028	110.269	229	820	1.272253	-0.932852	2.205105	109.3501	719	554
Government effectiveness	1.320935	-0.2300726	1.5510076	86.08231	230	796	1.265476	-0.113277	1.378753	81.13597	670	541
Rule of law	1.45097	-0.2327764	1.6837464	85.10515	230	796	1.406503	-0.3905557	1.7970587	124.3651	670	541
	High	Medium	Difference	t test	High	Medium	High	Medium	Difference	t test	High	Medium
Political stability	0.7006517	0.8763634	-0.1757117	-4.709854	83	230	0.806993	0.858154	-0.05116	-2.19159	228	670
Regulatory quality	1.755208	1.546532	0.208676	8.089843	86	230	1.75777	1.536164	0.221606	14.56948	228	670
Control of corruption	1.939005	1.609609	0.329396	7.358451	86	230	1.969899	1.556594	0.413305	15.44451	228	670
Freedom from corruption	1.753488	1.290393	0.463095	9.865683	86	229	1.7965	1.272253	0.524247	20.53538	240	719
Government effectiveness	1.708142	1.320935	0.387207	10.64665	86	230	1.703593	1.265476	0.438117	21.629	228	670
Rule of law	1.689979	1.45097	0.239009	11.22901	86	230	1.699775	1.406503	0.293272	24.7529	228	670

### 4.3. Methodology

#### 4.3.1. Investment–Cash Flow Sensitivity

Following Fazzari et al. (1988); Hovakimian (2009), we run the following regression to estimate the differences in investment–cash flow sensitivity between the PPP and non-PPP firms.

$$\begin{aligned} \left(\frac{I}{K}\right)_{it} = & \alpha + \beta_1\left(\frac{CF}{K}\right)_{it} + \beta_2PPP + \beta_3\left(\frac{CF}{K}\right)_{it} \times PPP \\ & + f(\text{Firm-level control variables}) + f(\text{Country-level control variables}) \\ & + \delta_i + \delta_t + i.Industry + i.Country + \epsilon_{it} \end{aligned} \quad (1)$$

In Equation (1),  $I$  denotes investment measured by the changes in gross fixed assets, while  $CF$  is cash flow measured by income before extraordinary items, depreciation, and amortization. Both are standardized by dividing by previous years' fixed assets ( $K$ ).

$PPP$  dummy takes value 1 for private sector firms investing in PPP (treatment group) and 0 for competing non-PPP private sector firms (control group). An interaction between *Cash flow* and  $PPP$  dummy is used to capture the differences in investment–cash flow sensitivity between the two groups.

$$PPP = \begin{cases} 1 & \text{if firms participate in PPPs (the treatment group)} \\ 0 & \text{if firms do NOT participate in PPPs (the control group)} \end{cases} \quad (2)$$

We use a list of *Control variables* that are expected to affect investment–cash flow sensitivity. *Firm-level control variables* include *Size*, *Leverage*, *Age*, and *Tobin's  $q_{t-1}$*  (Hovakimian, 2009)<sup>4</sup>. *Firm size* and *Age* are used as proxies to capture the ability to raise funds; smaller and younger firms usually face more difficulties in raising external funds because of higher borrowing costs (Hovakimian, 2009) and adverse selection problems (Myers and Majluf, 1984). Therefore, smaller and younger firms are expected to have higher investment–cash flow sensitivity. According to the corporate life cycle hypothesis (Hovakimian, 2009), firms have more investment opportunities but less cash flow when they are young and vice versa. Hence, a negative relationship between cash flow and investment is expected when firms become more mature. The variable *Leverage* can influence investment–cash flow sensitivity in two contrasting ways. Higher leverage can limit potential possibilities to raise external funds (Myers and Majluf, 1984) because of higher risk, but it also considered as lower financial constraints and lessen cash flow issues, thus reducing agency problems (Hovakimian, 2009). *Tobin's  $q_{t-1}$*  (with a one-year lag)(hereafter, *Tobin's  $q$* ) is

---

<sup>4</sup>See the Appendix for the definitions of these variables

used to capture investment opportunities. *Country – level control variables* include *Log GDP* and *Credit to private sector*<sup>5</sup>. We follow Masulis et al. (2011) to include *Log GDP* to control the biases arising from the differences in market size across countries and *Credit to private sector* to control the capital availability in the economy. They argue that the different level of available capital in different economies can influence how firms overcome their financial constraints<sup>6</sup>. To deal with unobservable fixed effects,  $\delta_i, \delta_t$  are used to capture firm fixed-effects and time-effects respectively, while *i.Industry, i.Country* are the generated industry dummies and country dummies to control industry and country effects.

#### 4.3.2. Disentangling the Cause for Investment–Cash Flow Sensitivity: Underinvestment or Overinvestment

One potential interpretation problem associated with investment–cash flow sensitivity is that it can be attributed to both underinvestment and overinvestment. We address this potential interpretation problem by exploring whether investment–cash flow sensitivity is caused by underinvestment or overinvestment. Firms with high investment opportunities (high Tobin’s q) may suffer more information asymmetries and have less pledged assets, resulting in high dependence on internal cash flow (Myers and Majluf, 1984; Pawlina and Renneboog, 2005). Meanwhile, according to Jensen and Meckling (1976), managers tend to overinvest free cash flow to pursue their pecuniary and non-pecuniary benefits of larger firm size. Firms with low growth opportunities (low Tobin’s q) have more overinvestment problems due to the shortage of projects with positive NPV, leading to high investment–cash flow sensitivity.

We use Tobin’s q with a one-year lag to capture investment opportunities and then follow Dawson and Richter (2006) to interpret the three-way interaction *PPP\*Tobin’s q\*Cash flow*. We first run the regression seen below regarding the three-way interaction.

$$\begin{aligned} \left(\frac{I}{K}\right)_{it} = & \alpha + \beta_1\left(\frac{CF}{K}\right)_{it} + \beta_2PPP + \beta_3Tobin's\ q + \beta_4\left(\frac{CF}{K}\right)_{it} \times PPP + \beta_5\left(\frac{CF}{K}\right)_{it} \times Tobin's\ q \\ & + \beta_6PPP \times Tobin's\ q + \beta_7PPP \times Tobin's\ q \times \left(\frac{CF}{K}\right)_{it} + f(Firm - level\ control\ variables) \quad (3) \\ & + f(Country - level\ control\ variables) + \delta_i + \delta_t + i.Industry + i.Country + \epsilon_{it} \end{aligned}$$

---

<sup>5</sup>See the Appendix for the definitions of these variables

<sup>6</sup>Instead of using *Credit to private sector* as a measurement of capital availability, we also follow Masulis et al. (2011) to use alternative indicators of capital availability, such as *Credit to domestic market capitalization* and *Domestic savings to GDP* of The World Bank (2016), *Political Stability* of Kaufmann et al. (2011) or *Financial freedom* of The Heritage Foundation (2016). The sign and the significance of the main results remain the same

Subsequently, we compute simple slopes of the variable *Investment* on the variable *Cash flow*, where the moderator variables *PPP* and *Tobin's q* are held constant at different combinations of high and low values. We then compare these simple slopes and test whether their differences are significant from zero in predicting the *Investment* variable. Consequently, there are six pairs of slopes.

- (1) (PPP and high Tobin's q) - (PPP and low Tobin's q)
- (2) (PPP and high Tobin's q) - (Non-PPP and high Tobin's q)
- (3) (PPP and low Tobin's q) - (Non-PPP and low Tobin's q)
- (4) (Non-PPP and high Tobin's q) - (Non-PPP and low Tobin's q)
- (5) (PPP and high Tobin's q) - (Non-PPP and low Tobin's q)
- (6) (PPP and low Tobin's q) - (Non-PPP and high Tobin's q)

In order to correctly interpret the results on whether the differences in investment–cash flow sensitivity in PPP firms are caused by underinvestment or overinvestment, we focus on the first three pairs (Pair 1, Pair 2, and Pair 3). This is because with two variables (*PPP* and *Tobin's q*), we need to keep one moderator constant, and the other one changes from a high value to a lower one. Accordingly, the interpretation is illustrated in Figure 3 and visualized in Figure 4.

Figure 3: Hypothesis Development Matrix on Causes of Investment–Cash Flow Sensitivity

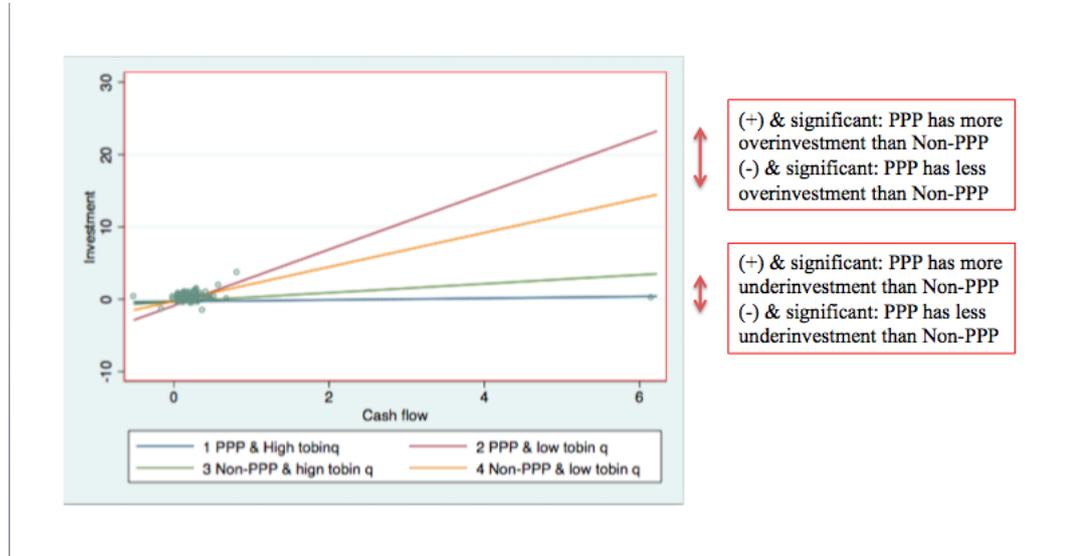
This figure presents the 3 x 2 matrix for hypothesis development. Each cell (or entry) shows the value of changes in simple slopes when combining the moderators PPP and Tobin's q. We consider two different values, including positively and negatively statistically significant ones, to interpret the value in each cell.

	PPP - PPP	PPP - Non-PPP
High q - Low q	(+): PPP has underinvestment (-): PPP has overinvestment	No prediction
High q - High q	No prediction	(+): PPP has more underinvestment than Non-PPP (-): PPP has less underinvestment than Non-PPP
Low q - Low q	No prediction	(+): PPP has more overinvestment than Non-PPP (-): PPP has less overinvestment than Non-PPP

In Figure 3, the entry for (1,1), which refers to Pair 1, captures the differences of simple slopes when we keep the moderator *PPP* constant and let the moderator *Tobin's q* change from a high value to a low one (one standard deviation above and below the mean, respectively) (Dawson and Richter, 2006). The entry for (1,1) is visualized in Figure 4 by the slope differences between the blue regression line (PPP and high Tobin's q) and the red regression line (PPP and low Tobin's q). The value for (1,1) is positive and statistically significant, which means that PPP firms experience higher investment–cash flow sensitivity when the investment opportunities (*Tobin's q*) are higher. In other words, such firms may face a higher underinvestment problem as they are constrained

Figure 4: Graph of Slopes Indicating the Causes of Investment–Cash Flow Sensitivity

This figure visualizes the simple slopes of the variable *Investment* on the variable *Cash flow*, where the moderator variables *PPP* and *Tobin's q* are held constant at different combinations of the high and low levels.



by capital (for investments) even with high growth investment opportunities. On the other hand, if the entry for (1,1) is negative then it indicates that such firms face overinvestment, as firms with low growth opportunities face higher capital constraints (Vogt, 1997). In other words, firms with low growth opportunities still find easily available cash flow for more investments, even these investments may not be effective. This leads them to overinvest.

Likewise, the entry for (2,1), regarding Pair 2, illustrates the difference of simple slopes when the moderator *PPP* dummy variable changes from the high value of 1 (referring to PPP) to the low value of 0 (referring to Non-PPP), and the moderator *Tobin's q* remains at the high level (one standard deviation above the mean) (Dawson and Richter, 2006) in both cases. This is captured in Figure 4 by the slope differences between the blue regression line (PPP and high Tobin's q) and the green regression line (Non-PPP and high Tobin's q). The positive difference indicates PPP firms with high q have higher sensitivity of cash flows to investments compared to non-PPP firms. This supports the underinvestment hypothesis (Pawlina and Renneboog, 2005; Vogt, 1994).

In cell (3,1) for Pair 3, the moderator *PPP* dummy changes from the high value of 1 to the low value of 0, and the moderator *Tobin's q* is low (one standard deviation below the mean) (Dawson and Richter, 2006) in both cases. This is captured in Figure 4 by the slope differences between the red regression line (PPP and low Tobin's q) and the orange regression line (Non-PPP and low Tobin's q). In this case, a higher sensitivity implies overinvestment, as PPP firms with low q

display higher demand for investment.

For robustness tests, we use the Bonferroni correction to reduce the probability of type I errors. The Bonferroni correction is conducted by calculating the adjusted- $p$  value. The adjusted- $p$  value is measured by dividing the critical  $p$ -value by the number of simultaneous tests (Dawson and Richter, 2006; Miller, 1966).

### 4.3.3. Role of Institutional Quality on Investment–Cash Flow Sensitivity of Private Sector Firms Across Different Economies

In order to explain why there are differences on the nature and benefits of PPP private sector firms across different economies, we follow the traditional "law-finance" theory, as originated by Porta et al. (1996) and Porta et al. (1997), to hypothesize the positive role of institutional quality on the reduction of private sector firms' capital constraints. To do that, we link the main regression on investment–cash flow sensitivity, which follows Fazzari et al. (1988); Hovakimian (2009), with the institutional quality effects by regressing 3-way interaction

$$\begin{aligned}
\left(\frac{I}{K}\right)_{it} = & \alpha + \beta_1\left(\frac{CF}{K}\right)_{it} + \beta_2PPP + \beta_3Institutional\ quality + \beta_4\left(\frac{CF}{K}\right)_{it} \times PPP \\
& + \beta_5\left(\frac{CF}{K}\right)_{it} \times Institutional\ quality + \beta_6PPP \times Institutional\ quality \\
& + \beta_7PPP \times Institutional\ quality \times \left(\frac{CF}{K}\right)_{it} + f(Firm - level\ control\ variables) \\
& + f(Country - level\ control\ variables) + \delta_i + \delta_t + i.Industry + i.Country + \epsilon_{it}
\end{aligned} \tag{4}$$

We follow Kaufmann et al. (2011) to include alternatively a set of variables as the measurement of institutional quality. They are *Political stability*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, and *Control of corruption*<sup>7</sup>. We also use *Freedom from Corruption* of The Heritage Foundation (2016) as the robust check for the effects of corruption on the differences of firms' capital constraints. The choice of variables based on the idea of Faccio (2006) who indicating that the incidence of political connections is associated with regulatory environment and corruption. There is every chance that in the economies with low institutional quality, especially in terms of poor protection of private properties, corruption, expropriation and discrimination, private sector firms with political connections can take advantages of receive government-back support for achieving external financing (Bai et al., 2006; Li et al., 2008; Firth et al., 2009). Even PPPs can provide private sector firms with a greater platform to access preferential financing, since the PPP contract

<sup>7</sup>See the Appendix for the definitions of these variables

mechanism allows the government to allocate government pledgable assets, government subsidies or even state-owned banking financing (La Porta et al., 2002; Engel et al., 2010). Therefore, in these analyses, testing the effects of these variables enable us to explore whether the benefits of private sector firms in highly corrupt economies can offset the disadvantages of low institutional quality.

Subsequently, we again follow Dawson and Richter (2006) to compute simple slopes of the variable *Investment* on the variable *Cash flow*, where the moderator variables *PPP* and *Institutional quality* are held constant at different combinations of high and low values. we then compare these simple slopes and test whether their differences are significant from zero in predicting the *Investment* variable. Consequently, there are six pairs of slopes.

- (1) (PPP and high institutional quality ) - (PPP and low institutional quality)
- (2) (PPP and high institutional quality) - (Non-PPP and high institutional quality)
- (3) (PPP and low institutional quality) - (Non-PPP and low institutional quality)
- (4) (Non-PPP and high institutional quality) - (Non-PPP and low institutional quality)
- (5) (PPP and high institutional quality) - (Non-PPP and low institutional quality)
- (6) (PPP and low institutional quality) - (Non-PPP and high institutional quality)

If there are significant results on the slope differences when we keep the variable *Institutional quality* constant, as indicated in Pair 2 and Pair 3, it is suggested that the differences of capital constraints between PPP private sector firms and their non-PPP counterparts are attributed to the impacts of institutional quality.

## 5. Data Analysis

### 5.1. Public–Private Partnerships and Investment-Cash Flow Sensitivity

Tables VII and VIII compares investment–cash flow sensitivity between PPP and non-PPP firms in the PPP investment year and five years post PPP investment. The objectives of this analysis are to understand the influence on firm characteristics, in particular, their internal cash flows, on firm investments and whether their effects vary across economies.

At the time of engaging in PPP contracts, we find that, for all sample, as shown in Column 1 of Table VII, private sector firms experience higher investment-cash flow sensitivity compared with their non-PPP counterparts. This is evident from the positive and significant coefficient for the interaction variable between the PPP dummy and internal cash flows. Take into considering the economic features and market maturity, there are no significant differences between PPP and non-PPP firms for the sample of firms in developed economies, as indicated in Column 2 of Table

VII. However, if we divide these firms into two groups based on their PPP market maturity, as indicated in Columns 3 and 4 of Table VII only PPP firms in the medium mature market witness higher investment-cash flow sensitivity compared with their competing non-PPP firms, while there is no difference in private sector firms in the high mature market. Column 5 of Table VII reports the results of firms in the low mature market, indicating higher investment-cash flow sensitivity for PPP firms. Based on the magnitude of the coefficients, for the medium-mature economies, as shown in Column 4 of Table VII, the investment-cash flow sensitivity for PPP private sectors firms are approximately 152.57 % ( $0.9882549/0.6397341$ ) higher than that for non-PPP firms. However, the result of the low-mature economies witness higher differences between PPP and non-PPP firms because, as indicated in Column 5 of Table VII, non-PPP firms even indicate negative investment-cash flow sensitivity (evident from the negative coefficient of the variable *Cash flow*), while the interaction term between *PPP* and *Cash flow* is still positive and significant. Overall, the results highlight that private sector firms with more capital constraints opt for PPPs, and the issue of higher capital constraints of PPP firms are more significant in PPP firms in emerging economies.

We now turn to our post-PPP analysis. Table VIII report the results of the main regression on investment-cash flow sensitivity in the 5-year post-PPP period. The coefficient of the variable *Cash flow* is positive and significant, indicating the positive sensitivity between investment and cash flow among non-PPP private sector firms. However, investment is significant less sensitive to cash flow for PPP private sector firms, as shown by the negative coefficient of the interaction terms *PPP* and *Cash flow*. This is consistent with our hypothesis that in the long run, PPP private sector firms experience low capital constraints compared with their non-PPP counterparts. These results can be seen significant in both developed and emerging economies, except for one subgroup of developed economies with high mature PPP markets. Regarding the magnitude of the coefficients, the investment-cash flow sensitivity of PPP private sector firms in developed economies, as indicated in Column 2 of Table VIII is about 93.71% ( $=-0.9120969/0.9732919$ ) lower than their non-PPP counterparts. For the subgroup of firms in medium mature PPP market in Column 4, the figure is a little bit lower, 73.39%. Meanwhile, in emerging economies, as indicated in Column 5, PPP firms witness about 36.07% ( $-0.0999187/0.2770143$ ) lower than their non-PPP competing firms. Therefore, the benefits of lower capital constraints of private sector firms through PPP investments are higher in developed economies with medium mature PPP markets compared with those in emerging economies. This is consistent with our hypothesis as well as the descriptive analysis that documents a higher leverage can be witnessed in the long run in PPP firms in developed economies compared with those in emerging economies.

## 5.2. Underinvestment or Overinvestment

To explain these above differences of investment-cash flow sensitivity, Tables IX and X explore whether the higher investment-cash flow sensitivity of PPP private sector firms are attributed to underinvestment or overinvestment.

At the time engaging in PPP investment, for all sample, as indicated in Panel A of Table IX, the difference between PPP and non-PPP firms is only significant at the subgroup of low *Tobin's q* as can be seen in the pair 3 (*PPP & low q*)-(NonPPP & low q). This indicates that PPP private sector firms with low investment opportunities experience higher cash burden than non-PPP firms with low investment opportunities. This supports the overinvestment hypothesis of Jensen (1986), showing that the higher investment-cash flow sensitivity of PPP private sector firms may be caused by overinvestment, or in other words, for all sample, private sector firms with more overinvestment problems opt for PPPs. The same results are reported for PPP firms in developed economies, especially those in the medium mature PPP market, as shown in Panel B and D of Table IX. Private sector firms in the high mature PPP market experience no significant differences between PPP and non-PPP firms, as indicated in Panel C. By contrast, for private sector firms in the emerging markets with low mature PPP markets, the difference between PPP firms and their non-PPP counterparts are positive and significant at both subgroups of high *q* and low *q* firms, as indicated in Pair 2 and Pair 3 of Panel E. This implies that both underinvestment and overinvestment problems drive private sector firms in emerging markets opting for PPPs. Considering the magnitude of the slope differences, as indicated in Panel E, the subgroup of high-*q* firms (in Pair 2) experience higher difference than those of low-*q* firms. Moreover, when considering only PPP firms, as indicated in Pair 1 (*PPP & high q*)-(NonPPP & high q) of all Panels in Table IX, the highlight feature is that while in developed economies, PPP firms with high investment opportunities experience lower cash burden than those with low investment opportunities, the inverse results are witnessed at PPP firms in emerging economies. Overall, overinvestment problems drive private sector firms to go for PPPs in developed economies, especially those in the medium mature PPP markets, whereas opting for PPPs in emerging economies are more likely driven by underinvestment problems. This is consistent with the descriptive analysis. While in developed economies, firms with abundant cash flow opt for PPPs to solve their problems of overinvestment, in emerging economies, firms with more untapped investment opportunities opt for PPPs to alleviate capital constraints caused by underinvestment.

For the 5-year post-PPP investment, as indicated in Table X, PPP private sector firms with low growth opportunities (low *Tobin's q*) in all kinds of economies and PPP market maturity experience

a lower investment-cash flow sensitivity compared with their non-PPP firms. This is evident from the negative and significant slope difference between *PPP and low q* and *non – PPP and low q*. These results support the overinvestment hypothesis of Jensen and Meckling (1976), suggesting that PPP firms across economies can reduce their overinvestment problems after 5-year participating projects. However, only PPP firms in the developed economies with the medium mature PPP market can achieve a significant lower investment-cash flow sensitivity in the high-q group. This is evident from the negative and significant slope difference between *PPP and high q* and *non – PPP and high q*. This results explore that PPP firms in the developed economies with the medium mature PPP market may receive better benefits compared with those in emerging economies. This is evident by the ability to lower both under and overinvestment problems of PPP firms in the medium mature PPP market in the 5-year post-PPP period. This is consistent with the results of the main regression in Table VIII which indicate that PPP in the medium mature PPP market can lower more capital constraints compared with those in emerging economies with the low mature PPP market.

### 5.3. Role of Institutional Quality

The above results indicate that PPP private sector firms in developed economies with the medium mature PPP market experience more deduction in capital constraints compared with those in emerging economies with low mature PPP market. we further test our results for robustness by testing the direct effects of institutional quality indicators on private sector firms' investment-cash flow sensitivity.

Table XI and Panel A of Table XIII report the results on the effects of institutional quality at the time of PPP investments. As shown in Table XI, PPP private sector firms still document a higher investment-cash flow sensitivity compared with their non-PPP firms after controlling for the effects of institutional quality. This is evident from the negative and significant coefficients of the interaction term between *PPP* and *Cash flow*. However, PPP private sector firms in higher institutional quality experience lower investment-cash flow sensitivity, as indicated by the negative coefficients of the 3-way interaction *PPP\*Cash flow\*Institutional quality*. These results are especially significant when I use *Political stability* or *Regulation|quality* as indicators of institutional quality. To confirm these results, Panel A of Table XIII reports the results when I follow Dawson and Richter (2006) to interpret 3-way interaction *PPP\*Cash flow\*Institutional quality* by regressing the dependent variable *Investment* on *Cash flow* when the moderate variables *PPP* and *Institutional quality* hold constant at high or low level. As shown in Panel A of Table XIII, there is positive and significant slope difference between *PPP firms and low institutional quality*

Table VII: Cross-Country Analysis - Investment-Cash Flow Sensitivity: PPP &amp; Non-PPP firms in the PPP year

This table compares investment-cash flow sensitivity between PPP firms and Non PPP firms. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation and amortization, divided by the previous years' fixed assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firm's incorporation. PPP is a dummy variable, which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Tobin's q* (with one year lag) is the market to book value of total assets to capture investment opportunities. *Log GDP*, *Credit to Private Sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5%, and 10% level.

Investment	All sample (1)	Developed (2)	High maturity (3)	Medium maturity (4)	Emerging-Low maturity (5)
Cash flow	-0.1236989	.5605838***	.2038711**	.6397341***	-.2278985*
	-1.191768	3.09966	2.460834	2.944299	-1.858549
Leverage	2.124341***	4.589238***	-0.1198037	3.808473***	-0.1091226
	3.439341	10.38397	-0.3328244	7.682695	-0.113874
Age	0.0217335	-0.0096612	-0.0096315	-0.0100534	0.0254122
	0.9594278	-0.6403363	-1.352242	-0.5674892	0.6976247
Size	-0.6522442	-.4260299**	-0.0879295	-0.4027821	-.6490729**
	-2.868576***	-2.013561	-0.8596198	-1.613913	-2.086608
Tobin's q	-0.0481702	0.0119356	0.013	-0.0424789	-0.0548055
	-1.19167	0.2060361	0.8544758	-0.3911748	-1.129034
PPP	0.2371449	0.3579788	.210567*	0.1179386	0.1450055
	0.903659	1.593318	1.71057	0.4547671	0.4070252
PPP # Cash flow	0.3225442***	0.1296313	-0.0584964	0.9772549***	0.5248393***
	2.988885	0.6607887	-0.6794337	3.84414	3.968845
Log GDP	0.312454	0.0263931	0.0269765	-0.3459277	0.5988296
	0.4333467	0.0227699	0.0596339	-0.2366895	0.5508475
Credit to Private Sector	0.005929	0.0048395	0.0007207	-0.0064961	-0.006252
	0.5450048	0.8425539	0.3650931	-0.7591306	-0.2310092
Country dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Constant	3.597077	1.076245	0.4584542	6.84691	2.90322
	0.4112115	0.0818286	0.0907259	0.4048054	0.2244495
r2	8.0601	47.95619	53.3186	63.0206	10.14911
N	1007	299	82	217	708

Table VIII: Cross-Country Analysis - Investment-Cash Flow Sensitivity: PPP & Non-PPP firms in the 5-year Post-PPP Period

This table compares investment-cash flow sensitivity between PPP firms and Non PPP firms. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation and amortization, divided by the previous years' fixed assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firm's incorporation. PPP is a dummy variable, which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Tobin's q* (with one year lag) is the market to book value of total assets to capture investment opportunities. *Log GDP*, *Credit to Private Sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5%, and 10% level.

Investment	All sample (1)	Developed (2)	High maturity (3)	Medium maturity (4)	Emerging-Low maturity (5)
Cash flow	0.6871894*** 15.07941	0.9732919*** 14.17207	0.0835479** 2.085015	1.338792*** 15.31692	0.2770143*** 9.930793
Leverage	0.1662207** 2.810108	0.1258949** 2.150383	2.977706*** 11.87846	0.098686 1.532792	-0.4298139* -1.665224
Size	-0.238586* -1.680649	-0.5168715** -2.081067	-0.1666357 -1.519022	-0.6451983** -2.009161	-0.0640156 -1.117467
Age	-0.0227231 -1.215541	-0.013932 -0.6249715	0.009979 0.9168753	-0.0060669 -0.2209168	-0.0324607** -2.809696
Tobin's q	-0.0311719 -0.7795958	0.0200739 0.2665698	-0.0726372** -2.466288	0.11715 0.9503948	0.0070524 0.3140559
PPP	0.4793447* 1.899091	0.6782513** 2.261577	0.1546397 1.045661	0.6715195* 1.838341	0.0281153 0.2606972
PPP # Cash flow	-0.6011943*** -8.276557	-0.9120969*** -8.618141	0.0074171 0.1500448	-0.9826107*** -5.790515	-0.0999187* -1.814438
Log GDP	0.2571968 0.4176218	0.6434991 0.5328665	0.1472101 0.2418772	-0.2396141 -0.1277602	0.6771624** 1.988595
Credit to Private Sector	0.0012004 0.2645029	0.0027413 0.4731971	-0.0042643 -0.838112	0.0027994 0.4077287	-0.0094789 -1.295962
Country dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Constant	-1.674779 -0.232304	-5.357458 -0.3843944	0 0	6.583055 0.2835852	0 0
r2	19.16	30.47	44.84	40.29	29.3
N	1442	918	227	691	524

and *non – PPP firms and low institutional quality*. However, when considering the subgroup of PPP private sector firms and their non-PPP counterparts in high institutional-quality economies, there are no evidence of positive and significant slope. Therefore, it can be concluded that only in low institutional-quality economies, private sector firms with higher capital constraints opt for PPPs. This is consistent with the descriptive analysis and the above results of difference economies (developed or emerging) comparison, which indicate the difference of nature of firms opting for PPPs. While private sector firms in economies with low institutional quality opt for PPPs to alleviate capital constraints commonly attributed to underinvestment, those in economies with high institutional quality opt for PPPs to solve the problem of overinvestment caused by abundant cash flow.

Table XII and Panel B of Table XIII report the results on the effects of institutional quality in the post-PPP period (5 years). After 5 years participating in PPPs, as indicated in Table XII, PPP private sector firms benefit from lower investment-cash flow sensitivity compared with their non-PPP firms even after controlling for the influence of institutional quality. This is evident from the negative and significant coefficients of the interaction term between *PPP* and *Cash flow*. Moreover, PPP private sector firms in economies with higher institutional quality document benefit more from lower investment-cash flow sensitivity compared with those in economies with lower institutional quality. This is evident from the negative and significant coefficients of the 3-way interaction *PPP\*Cash flow\*Institutional quality* when I alternatively using different measurements of institutional quality. These results are strongly significant in case of high political stability, high regulatory quality and strict control of corruption. To support for the highlighted evidence, Panel B of Table XIII reports the slope-difference result to interpret the 3-way interaction *PPP\*Cash flow\*Institutional quality*. At the subgroup of firms in economies with high institutional quality, PPP private sector firms experience a significantly lower of investment-cash flow sensitivity compared with their competing non-PPP firms. This is evident from the negative and significant slope differences between *PPP firms and high institutional quality* and *non – PPP firms and high institutional quality*. For the subgroup of firms in economies with low institutional quality, as indicated in the slope differences between *PPP firms and low institutional quality* and *non – PPP firms and low institutional quality*, the significant results only happen when considering *Regulatory quality*, *Control of corruption* and *Freedom from corruption* as the indicators of institutional quality. However, the magnitude of the slope differences in case of low institutional quality are lower than those in the context of high institutional quality. These results highlight two conclusions. The first one is the benefits of lower capital constraints through PPP investment are more significant in the context of high institutional quality. This strongly supports my

Table IX: Cross-Country Analysis - Reason for Differences in Investment-Cash Flow Sensitivity - PPP firms & Non-PPP firms in the PPP year

This table uses Slope Difference to show whether the differences between PPP firms and Non-PPP firms in Investment-cash flow sensitivity are caused by underinvestment or overinvestment. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Tobin's q* (with one year lag) is to capture investment opportunities. *Adjusted P* is a Bonferroni adjusted p-value which accounts for the fact that there are six post-hoc tests. This is a conservative adjustment by multiplying each of the p-values by the number of tests. \*\*\*, \*\*, \* indicate significant at 1%, 5%, and 10% level.

Panel A: All sample	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	-0.0017853	0.078797	-0.02	0.982	5.892
(PPP&high q)-(NonPPP&high q)	-0.0274097	0.1370285	-0.2	0.842	5.052
(PPP&low q)-(NonPPP&low q)	0.8166148	0.1782573	4.58	0	0***
(NonPPP&high q)-(NonPPP&low q)	0.8422392	0.2102397	4.01	0	0***
(PPP&high q)-(NonPPP&low q)	0.8148295	0.1663261	4.9	0	0***
(PPP&low q)-(NonPPP&high q)	-0.0256245	0.1530472	-0.17	0.867	5.202
Panel B: Developed economies	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	-1.276475	0.1572575	-8.12	0	0***
(PPP&high q)-(NonPPP&high q)	-0.525037	0.238211	-2.2	0.028	0.168
(PPP&low q)-(NonPPP&low q)	1.274253	0.2723458	4.68	0	0***
(NonPPP&high q)-(NonPPP&low q)	0.5228146	0.320527	1.63	0.104	0.624
(PPP&high q)-(NonPPP&low q)	-0.0022224	0.2519703	-0.01	0.993	5.958
(PPP&low q)-(NonPPP&high q)	0.7514383	0.2503069	3	0.003	0.018
Panel C: Developed economies-High maturity	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	-0.274446	0.0586683	-4.68	0	0***
(PPP&high q)-(NonPPP&high q)	-0.1735307	0.083794	-2.07	0.043	0.258
(PPP&low q)-(NonPPP&low q)	0.3412496	0.1502284	2.27	0.027	0.162
(NonPPP&high q)-(NonPPP&low q)	0.2403342	0.1558224	1.54	0.128	0.768
(PPP&high q)-(NonPPP&low q)	0.0668035	0.1439736	0.46	0.644	3.864
(PPP&low q)-(NonPPP&high q)	0.1009154	0.0942527	1.07	0.289	1.734
Panel D: Developed economies-Medium maturity	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	-1.121425	0.3800308	-2.95	0.004	0.024**
(PPP&high q)-(NonPPP&high q)	-0.2072926	0.4361948	-0.48	0.635	3.81
(PPP&low q)-(NonPPP&low q)	1.588621	0.3336732	4.76	0	0***
(NonPPP&high q)-(NonPPP&low q)	0.6744884	0.4115622	1.64	0.103	0.618
(PPP&high q)-(NonPPP&low q)	0.4671958	0.4395438	1.06	0.289	1.734
(PPP&low q)-(NonPPP&high q)	0.9141323	0.3383729	2.7	0.008	0.048**
Panel E: Emerging economies-Low maturity	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	2.140123	0.0922322	23.2	0	0***
(PPP&high q)-(NonPPP&high q)	2.051561	0.1278347	16.05	0	0***
(PPP&low q)-(NonPPP&low q)	0.7806361	0.1399227	5.58	0	0***
(NonPPP&high q)-(NonPPP&low q)	0.8691983	0.165961	5.24	0	0***
(PPP&high q)-(NonPPP&low q)	2.920759	0.1479855	19.74	0	0***
(PPP&low q)-(NonPPP&high q)	-0.0885622	0.120408	-0.74	0.462	2.772

Table X: Cross-Country Analysis - Reason for Differences in Investment-Cash Flow Sensitivity - PPP firms & Non-PPP firms in the 5-year Post-PPP period

This table uses Slope Difference to show whether the differences between PPP firms and Non-PPP firms in Investment-cash flow sensitivity are caused by underinvestment or overinvestment. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Tobin's q* (with one year lag) is to capture investment opportunities. *Adjusted P* is a Bonferroni adjusted p-value which accounts for the fact that there are six post-hoc tests. This is a conservative adjustment by multiplying each of the p-values by the number of tests. \*\*\*, \*\*, \* indicate significant at 1%, 5%, and 10% level.

All sample	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	0.2646095	0.1065398	2.48	0.013	0.078*
(PPP&high q)-(NonPPP&high q)	-0.7083268	0.0966962	-7.33	0	0***
(PPP&low q)-(NonPPP&low q)	-0.3832469	0.0977969	-3.92	0	0***
(NonPPP&high q)-(NonPPP&low q)	0.5896894	0.0809536	7.28	0	0***
(PPP&high q)-(NonPPP&low q)	-0.1186374	0.1003543	-1.18	0.237	1.422
(PPP&low q)-(NonPPP&high q)	-0.9729363	0.0944352	-10.3	0	0***
Developed economies	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	0.3037551	0.1312392	2.31	0.021	0.126
(PPP&high q)-(NonPPP&high q)	-2.28039	0.1385345	-16.46	0	0***
(PPP&low q)-(NonPPP&low q)	-0.5550644	0.1185762	-4.68	0	0***
(NonPPP&high q)-(NonPPP&low q)	2.029081	0.1136216	17.86	0	0***
(PPP&high q)-(NonPPP&low q)	-0.2513093	0.1125404	-2.23	0.026	0.156
(PPP&low q)-(NonPPP&high q)	-2.584145	0.1434134	-18.02	0	0***
Developed economies-High maturity	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	0.9581337	0.0957841	10	0	0***
(PPP&high q)-(NonPPP&high q)	0.1122982	0.0690797	1.63	0.104	0.624
(PPP&low q)-(NonPPP&low q)	-0.8785928	0.0992005	-8.86	0	0***
(NonPPP&high q)-(NonPPP&Low q)	-0.0327574	0.076191	-0.43	0.667	4.002
(PPP&high q)-(NonPPP&low q)	0.0795409	0.0468858	1.7	0.09	0.54
(PPP&low q)-(NonPPP&high q)	-0.8458354	0.112003	-7.55	0	0***
Developed economies-Medium maturity	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	0.8007728	0.280562	2.85	0.004	0.024**
(PPP&high q)-(NonPPP&high q)	-2.168283	0.2995862	-7.24	0	0***
(PPP&low q)-(NonPPP&low q)	-0.4028182	0.1405284	-2.87	0.004	0.024**
(NonPPP&high q)-(NonPPP&low q)	2.566237	0.1256052	20.43	0	0***
(PPP&high q)-(NonPPP&low q)	0.3979546	0.288401	1.38	0.168	1.008
(PPP&low q)-(NonPPP&high q)	-2.969055	0.1664869	-17.83	0	0***
Emerging economies-Low maturity	Coef.	Std. Err.	t	P value	Adjusted P
(PPP&high q)-(PPP&low q)	0.3034766	0.087553	3.47	0.001	0.006***
(PPP&high q)-(NonPPP&high q)	0.1263734	0.0742039	1.7	0.089	0.534
(PPP&low q)-(NonPPP&low q)	-2.27815	0.1951039	-11.68	0	0***
(NonPPP&high q)-(NonPPP&low q)	-2.101047	0.1904415	-11.03	0	0***
(PPP&high q)-(NonPPP&low q)	-1.974674	0.2009978	-9.82	0	0***
(PPP&low q)-(NonPPP&high q)	-0.1771033	0.0576136	-3.07	0.002	0.012**

Table XI: Cross-Country Analysis - The Effects of Institutional Quality in the PPP year - Main Regression

This table reports the results of Regression 3 to study the effects of institutional quality on private sector firms' investment-cash flow sensitivity. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation, and amortization, divided by the previous years' fixed assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firms' incorporation. *Tobin's q* (with one year lag) is to capture investment opportunities. *Political stability*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, *Control of corruption* and *Freedom from corruption* are to capture institutional quality. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

Investment	(1)	(2)	(3)	(4)	(5)	(6)
	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t
Cash flow	0.0104428	-0.1500495	-0.0302256	0.0499855	-0.1402145	-0.0058313
Leverage	0.0937851	-1.427691	-0.2755467	0.3353145	-1.300811	-0.0561136
	2.87845***	2.279974***	2.069206***	2.116338***	2.227866***	1.903052**
	4.821162	3.622914	3.304827	3.405518	3.521372	3.187415
Size	-0.6004445***	-0.6524617***	-0.6474851**	-0.6410499**	-0.6457479***	-0.6457479***
	-2.752854	-2.819485	-2.811397	-2.800841	-2.772639	-2.702142
Age	0.0376321*	0.0266229	0.0190135	0.0208296	0.0233409	0.0106419
	1.730434	1.15437	0.8291324	0.9112934	1.00712	0.4868784
Tobin q	-0.0475462	-0.0507711	-0.0541468	-0.0488553	-0.0512834	-0.0610668
	-1.237553	-1.24349	-1.332137	-1.205548	-1.250936	-1.578005
PPP	0.6584096**	0.2599754	0.1995793	0.297065	0.2239987	0.1003621
	2.465053	0.9229601	0.7317298	1.079763	0.7254538	0.3448369
Political stability	-0.5547689					
	-0.6687699					
PPP=1 # Cash flow	0.4321204***	0.3258077***	0.3569712***	0.183844	0.337111***	0.5023302***
	3.401479	2.939741	2.981048	1.149358	2.986918	4.535694
Cash flow # Political stability	0.5502803***					
	2.599496					
PPP=1 # Political stability	0.9733398***					
	3.043121					
PPP=1 # Cash flow # Political stability	-1.54965***					
	-6.791428					
Regulatory quality		0.9276101				
		0.845606				
Cash flow # Regulatory quality		0.5591619**				
		2.324907				
PPP=1 # Regulatory quality		0.3684324				
		1.028847				
PPP=1 # Cash flow # Regulatory quality		-0.6896102***				
		-2.643395				
Control of corruption			-0.0979276			
Cash flow # Control of corruption			0.4872798***			
			2.7007			
PPP=1 # Control of corruption			0.0477064			
			0.173395			
PPP=1 # Cash flow # Control of corruption			-0.2403752			
			-1.234498			
Freedom from corruption				0.052676		
				0.0684391		
Cash flow # Freedom from corruption				0.2788934		
				1.623695		
PPP=1 # Freedom from corruption				0.1226178		
				0.4716404		
PPP=1 # Cash flow # Freedom from corruption				-0.228301		
				-1.223155		
Government effectiveness					1.500673	
					1.079649	
Cash flow # Government effectiveness					1.079649	
					0.3558377	
PPP=1 # Government effectiveness					0.06252	
					0.1703368	
PPP=1 # Cash flow # Government effectiveness					-0.0669743	
					-0.2516829	
Rule of law						-1.102787
						-0.7599358
Cash flow # Rule of law						0.6854861***
						3.466909
PPP=1 # Rule of law						1.529546
PPP=1 # Cash flow # Rule of law						0.2267281
						1.059959
Log gdp	0.3081805	0.5192227	0.7714751	0.3893426	0.2697121	0.3665141
	0.4107316	0.6551299	0.9721304	0.5000579	0.3665141	0.4522122
Credit to private sector	0.0042243	0.0064079	0.0016346	0.0038234	0.0110952	0.0110952
	0.4023445	0.5537398	0.1372927	0.3380137	0.003963	0.9133433
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	4.215314	33 -0.8360596	-2.045292	2.339509	0.687689	0.1940933
	0.4544927	-0.0889776	-0.1953644	0.260678	0.1940933	0.0729012
r2	19.66124	8.99418	9.84383	8.37816	8.33513	18.43995
N	981	984	984	1004	984	984

Table XII: Cross-Country Analysis - The Effects of Institutional Quality in the 5-year Post-PPP Period - Main Regression

This table reports the results of Regression 3 to study the effects of institutional quality on private sector firms' investment-cash flow sensitivity. *Investment* is measured by the changes in gross fixed assets, divided by the previous years' fixed assets. *Cash flow* denotes income before extraordinary items, depreciation, and amortization, divided by the previous years' fixed assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Age* is measured from the year of firms' incorporation. *Tobin's q* (with one year lag) is to capture investment opportunities. *Political stability*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, *Control of corruption* and *Freedom from corruption* are to capture institutional quality. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

	m1	m2	m3	m4	m5	m6
	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t
Cash flow	0.3958923***	0.474169***	0.5087102***	.5794032***	0.3958181***	0.4658199***
	7.06594	6.470923	7.743131	11.36472	6.037253	7.32321
Leverage	0.1040642**	0.1196093**	0.1268234**	0.1195498**	0.11607**	0.1171256**
	2.272394	2.33749	2.431044	2.39451	2.365988	2.354263
Size	-0.2451178**	-0.2383824*	-0.2457957*	-0.2315132*	-0.2400332*	-0.2404978*
	-2.000709	-1.795102	-1.826107	-1.803167	-1.860291	-1.843052
Age	-0.0204268	-0.0196586	-0.019349	-0.0192777	-0.0193223	-0.017914
	-1.293369	-1.134434	-1.098696	-1.163113	-1.151059	-1.054322
Tobin q	-0.0081518	-0.026248	-0.0269541	-0.0226001	-0.0197793	-0.0193606
	-0.2042146	-0.6458186	-0.6629089	-0.5653227	-0.4902325	-0.4777097
PPP	0.2386193	0.1790362	0.1669779	0.2849822	0.0166394	0.0316479
	1.129063	0.5741582	0.5833119	1.219729	0.0539623	0.101206
Political stability	-1.097887***					
	-3.279223					
PPP=1 # Cashflow	-0.2751789***	-0.2799936**	-0.3433646***	-0.4328821***	-0.215414**	-0.2752156***
	-3.167137	-2.418497	-3.409523	-5.185115	-1.975144	-2.698754
Cashflow # Political stability	0.6174375***					
	8.198939					
PPP=1 # Political stability	0.4048109*					
	1.708382					
PPP=1 # Cashflow # Political stability	-0.6465132***					
	-6.360145					
Regulatory quality		-0.061368				
		-0.1338481				
Cashflow # Regulatory quality		0.2467794***				
		3.594126				
PPP=1 # Regulatory quality		0.2964158				
		1.11095				
PPP=1 # Cashflow # Regulatory quality		-0.3475895***				
		-3.522674				
Control of corruption			-0.6162193			
			-1.224056			
Cashflow # Control of corruption			0.1962367***			
			3.613104			
PPP=1 # Control of corruption			0.2984994			
			1.490357			
PPP=1 # Cashflow # Control of corruption			-0.263082***			
			-3.684088			
Freedom from corruption				-0.1743736		
				-0.6395752		
Cashflow # Freedom from corruption				0.1799663***		
				4.109346		
PPP=1 # Freedom from corruption				0.2405867		
				1.411979		
PPP=1 # Cashflow # Freedom from corruption				-0.2386204***		
				-4.02531		
Government effectiveness					1.500673	
					1.079649	
Cash flow # Government effectiveness					1.079649	
					0.3558377	
PPP=1 # Government effectiveness					0.06252	
					0.1703368	
PPP=1 # Cash flow # Government effectiveness					0.1703368	
					-0.2516829	
Rule of law						-1.102787
						-0.7599358
Cash flow # Rule of law						0.6854861***
						3.466909
PPP=1 # Rule of law						1.529546
PPP=1 # Cash flow # Rule of law						0.2267281
						1.059959
log GDP	0.1780427	0.2422037	0.293172	0.2780033	0.3333956	0.3925218
	0.3146934	0.4062149	0.4886571	0.4821703	0.5726673	0.6634812
Credit to private sector	0.0013204	0.0016602	0.0003531	0.0013894	0.0014664	0.0014664
	0.2790694	0.3483576	0.0714331	0.3009767	0.001663	0.3081186
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.1405813	-1.662596	-1.019887	-1.911867	-1.760236	-1.760236
	0.0211999	-0.2400091	-0.1447738	-0.2835374	-0.6862089	-0.0985984
r2	30.08	23.48	23.2	24.05	26.57	25.43
N	1401	1401	1401	1441	1401	1401

Table XIII: Cross-Country Analysis - The Effects of Institutional Quality in the PPP year and the 5-year post-PPP period - Slope Difference Test

This table uses Slope Difference to show whether the differences between PPP firms and Non-PPP firms in Investment-cash flow sensitivity are influenced by Institutional Quality. PPP is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. I are the variables to indicate institutional quality, including *Political stability*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, *Control of corruption* and *Freedom from corruption*. Adjusted P is a Bonferroni adjusted p-value which accounts for the fact that there are six post-hoc tests. This is a conservative adjustment by multiplying each of the p-values by the number of tests. \*\*\*, \*\*, \* indicate significant at 1%, 5%, and 10% level.

	PPP year					5-year post-PPP				
	Coef.	Std. Err.	t	P value	Adjusted P	Coef.	Std. Err.	t	P value	Adjusted P
<b>Political stability</b>										
(PPP&high I)-(PPP& low I)	-1.658776	0.1486734	-11.16	0	0***	-0.0458633	0.108846	-0.42	0.673	4.038
(PPP&high I)-(NonPPP&high I)	-1.229222	-0.2142268	-5.74	0	0***	-0.9860973	0.095151	-10.36	0	0***
(PPP&low I)-(NonPPP&low I)	1.342921	0.2210609	6.07	0	0***	0.0336976	0.121171	0.28	0.781	4.686
(NonPPP&high I)-(NonPPP&low I)	0.9133675	0.3513633	2.6	0.009	0.054*	0.9739316	0.118788	8.2	0	0***
(PPP&high I)-(NonPPP&low I)	-0.3158548	0.2410927	-1.31	0.19	1.14	-0.0121658	0.108542	-0.11	0.911	5.466
(PPP&low I)-(NonPPP&high I)	0.4295535	0.1968655	2.18	0.029	0.174	-0.940234	0.110468	-8.51	0	0***
<b>Regulatory Quality</b>										
(PPP&high I)-(PPP& low I)	-0.2059364	0.1672706	-1.23	0.219	1.314	-0.1589493	0.113063	-1.41	0.16	0.96
(PPP&high I)-(NonPPP&high I)	-0.3844688	0.289879	-1.33	0.185	1.11	-0.8378408	0.101005	-8.3	0	0***
(PPP&low I)-(NonPPP&low I)	0.7042062	0.1817015	3.88	0	0***	-0.2897899	0.113641	-2.55	0.011	0.066*
(NonPPP&high I)-(NonPPP&low I)	0.8827386	0.3796877	2.32	0.02	0.12	0.3891017	0.108261	3.59	0	0***
(PPP&high I)-(NonPPP&low I)	0.4982698	0.2205337	2.26	0.024	0.144	-0.4487391	0.10282	-4.36	0	0***
(PPP&low I)-(NonPPP&high I)	-0.1785324	0.2663346	-0.67	0.503	3.018	-0.6788916	0.113328	-5.99	0	0***
<b>Control of Corruption</b>										
(PPP&high I)-(PPP& low I)	0.4960027	0.1552621	3.19	0.001	0.006***	-0.1457128	0.102408	-1.42	0.155	0.93
(PPP&high I)-(NonPPP&high I)	0.0751744	0.2955043	0.25	0.799	4.794	-0.8599069	0.102883	-8.36	0	0***
(PPP&low I)-(NonPPP&low I)	0.5580605	0.1611682	3.46	0.001	0.006***	-0.2864276	0.111799	-2.56	0.01	0.06*
(NonPPP&high I)-(NonPPP&low I)	0.9788888	0.3624574	2.7	0.007	0.042**	0.4277666	0.118393	3.61	0	0***
(PPP&high I)-(NonPPP&low I)	1.054063	0.206809	5.1	0	0***	-0.4321403	0.103158	-4.19	0	0***
(PPP&low I)-(NonPPP&high I)	-0.4208284	0.2701919	-1.56	0.12	0.72	-0.7141942	0.112762	-6.33	0	0***
<b>Freedom from Corruption</b>										
(PPP&high I)-(PPP& low I)	0.108112	0.1663526	0.65	0.516	3.096	-0.139424	0.096282	-1.45	0.148	0.888
(PPP&high I)-(NonPPP&high I)	-0.0041981	0.2923043	-0.01	0.989	5.934	-0.8472506	0.094631	-8.95	0	0***
(PPP&low I)-(NonPPP&low I)	0.4836632	0.167079	2.89	0.004	0.024**	-0.2800372	0.107648	-2.6	0.009	0.054*
(NonPPP&high I)-(NonPPP&low I)	0.5959733	0.3670475	1.62	0.105	0.63	0.4277894	0.104102	4.11	0	0***
(PPP&high I)-(NonPPP&low I)	0.5917752	0.2004207	2.95	0.003	0.018**	-0.4194612	0.095748	-4.38	0	0***
(PPP&low I)-(NonPPP&high I)	-0.1123101	0.2765874	-0.41	0.685	4.11	-0.7078266	0.107827	-6.56	0	0***
<b>Government effectiveness</b>										
(PPP&high I)-(PPP&low i)	0.0285951	0.181182	0.16	0.875	5.25	-0.1322289	0.1057693	-1.25	0.211	1.266
(PPP&high I)-(NonPPP&high I)	0.2576754	0.3082394	0.84	0.403	2.418	-0.9432749	0.0988567	-9.54	0	0***
(PPP&low I)-(NonPPP&low I)	0.3597218	0.1604521	2.24	0.025	0.15	-0.2419084	0.1051582	-2.3	0.021	0.126
(NonPPP&high I)-(NonPPP&low I)	0.1306415	0.3671378	0.36	0.722	4.332	0.5691375	0.0958507	5.94	0	0***
(PPP&high I)-(NonPPP&low I)	0.3883169	0.19815	1.96	0.05	0.3	-0.3741374	0.0956007	-3.91	0	0 ***
(PPP&low I)-(NonPPP&high I)	0.2290803	0.2910591	0.79	0.431	2.586	-0.8110459	0.1094083	-7.41	0	0 ***
<b>Rule of law</b>										
(PPP&high I)-(PPP&low i)	1.512975	0.1475849	10.25	0	0***	-0.1644336	0.1058829	-1.55	0.12	0.72
(PPP&high I)-(NonPPP&high I)	-0.731837	0.2928466	-2.5	0.013	0.078*	-0.8953378	0.0980909	-9.13	0	0***
(PPP&low I)-(NonPPP&low I)	0.3762727	0.1339876	2.81	0.005	0.03**	-0.2206884	0.1110266	-1.99	0.047	0.282
(NonPPP&high I)-(NonPPP&low I)	1.157411	0.3300921	3.51	0	0***	0.5102158	0.1055924	4.83	0	0***
(PPP&high I)-(NonPPP&low I)	1.889248	0.1834391	10.3	0	0***	-0.385122	0.0995616	-3.87	0	0***
(PPP&low I)-(NonPPP&high I)	-0.7811383	0.2699402	-2.89	0.004	0.024**	-0.7309042	0.1111849	-6.57	0	0***

main hypothesis. The second one is in the low level of *Regulatory quality*, *Control of corruption* or *Freedom from corruption*, PPP private sector firms still experience deduction in capital constraint, which supports the "political-tie" hypothesis; however, the magnitude of these benefits is lower than those PPP firms in high level of regulatory quality and control of corruption, which supports the "law-finance-growth" hypothesis. In other words, the "law-finance-growth" hypothesis seem to be predominant to support for lower capital constraints of private sector firms through PPP investment or the strong protection of private sector properties in the high institutional quality environment can offset the disadvantage of high barrier to exploiting preferential financing from political connections and corruption.

#### 5.4. Public–Private Partnerships and Firm Value

This section deals with how PPPs influence private sector firms' performance. Especially, this will explore whether institutional quality can moderate the benefits of PPPs in terms of firm value. Therefore, this is considered as the robust check for the previous tests on whether the "law-finance-growth" nexus can outperform the "political-tie" benefits. To do that, following Maury (2006); Masulis et al. (2011), we conduct the regression to test the effects of PPPs on firm value. In order to reduce the selection bias arising from how PPP private sector firms are chosen, both time-series and cross-section estimate of treatment effects are conducted. The time-series estimate compares PPP private sector firms' performance in between 5 years after and before PPP investment years while the cross-section estimate compares PPP firms and their non-PPP competing counterparts in the post-PPP investments (5 years). The main regression is

$$(Firm\ performance\ variables)_{it} = \alpha + \beta_1 PPP\ variable + f(Firm - level\ control\ variables) + f(Country - level\ control\ variables) + i.Industry + i.Country + \epsilon_{it} \quad (5)$$

$$(Firm\ performance\ variables)_{it} = \alpha + \beta_1 PPP\ variable + \beta_2 Economy\ variable + \beta_3 PPP\ variable * Economy\ variable + f(Firm - level\ control\ variables) + f(Country - level\ control\ variables) + i.Industry + i.Country + \epsilon_{it} \quad (6)$$

where *Firm performance variables* are measured by *Tobins' q* or *ROA* (Masulis et al., 2011). *PPP variable* can be PPP dummy (for the cross-section estimate) or PostPPP dummy (for the time-series estimate). In Equation 5, the significance of the coefficient of *PPP variable* will illustrate the difference between PPP private sector firms (in the post PPP period) and their control

group. In Equation 6, *Economy variable* can be *Economies*, *High low*, *Medium low*, *High medium* to compare firms performance among different economies (developed or emerging) or among different PPP market maturity (high-low-medium). *Economy variable* also can be on the list of *Institutional quality variables* that are the same as those indicated in Section Methodology to capture the influence of institutional quality on firm performance. Especially, the interaction term between *PPP variable* and *Economy variable* will show us whether institutional quality can moderate the benefits of private sector firms associated with PPP investments. Following Maury (2006); Masulis et al. (2011) and due to multicollinearity problem, only the below *Firm-level control variables* are included, namely *Size, Leverage, Capex/sales, Sale growth, Age, Market risk*<sup>8</sup>. The industry and country control are the same as those in Methodology Section.

Tables XIV, XV, XVI report the results of the differences between PPP and non-PPP private sector firms under the effects of PPP market maturity and institutional quality. Whereas, Tables XVII, XVIII, XIX reports the comparison of PPP private sector firms in between the post and pre-PPP periods under the effects of PPP market maturity and institutional quality.

Regarding the comparison between PPP and non-PPP private sector firms, as indicated in Table XIV, among different economies, only in the developed economies with the medium mature PPP market, PPP private sector firms experience higher firm value compared with their non PPP counterparts in the post-PPP period. This is evident from the positive and significant of the coefficients of the variable *PPP*, as indicated in both Column (4) (for *Tobin's q* as the indicator of firm performance) and Column (9) (for *ROA* as the indicator of firm performance) of Table XIV. To be more robust, Table XV report the results of how the variation in economies and market maturity influence the difference between PPP and their non-PPP counterparts. As indicated in Columns 1 of Table XV, in developed economies, the difference between PPP and non-PPP firms in terms of *Tobin's q* is higher than those in emerging economies. This is evident from the positive and significant of the interaction term between *PPP* and *Economies* variables. The similar results can be seen in Colum 5 if we use *ROA* as the indicator of firm performance. However, when we decompose PPP in developed economies into those in the high mature PPP market and medium mature PPP market, as shown in Column 3 and 7 of Table XV, only in the medium mature PPP market, the difference between PPP and non-PPP firms is higher than those in emerging economies with the low mature PPP market. The results are significant for both *Tobin's q* and *ROA* as the indicators of firm performance. To confirm again these results, Table XVI explore how institutional quality influence the difference between PPP and non-PPP firms in their post-PPP investments. The most highlighted result is that in the economies with higher institutional

---

<sup>8</sup>See Appendix for variable definition

quality, the differences of firm value between PPP and non-PPP firms are higher. These results are significant to alternative measurement of institutional quality. This is consistent with the above results when considering different economies with different PPP mature markets. This is, especially, consistent with our hypothesis that the benefits of increasing partnering private sector firms' value through PPP investments are more significant in mature economies with better institutional quality. Therefore, this robust test again confirms the dominance of the "law-finance-growth" nexus over the "political-tie" hypothesis in explaining the effects of the institutional quality on corporate finance.

Regarding the time-series comparison of PPP private sector firms in between the post and pre-PPP periods, Tables XVII, XVIII and XIX illustrate the same results; that is in the economies with higher institutional quality, the increase of PPP firm value in the post-PPP period are higher. In other words, institutional quality moderate the benefits of PPP investments by rewarding higher increase in PPP firm value. This is consistent with the above dominance of the positive effects of high institutional quality on PPP firms over those of low institutional quality in which politically connected firms benefit from government-back support.

Table XIV: Firm value: PPP & Non-PPP firms in the 5-year post-PPP period

This table compares PPP with non-PPP firms in terms of firm performance in the 5-year post-PPP period. Two firm-performance variables are *Tobin's q* and *ROA*. *Tobin's q* is measured by the market to book value of total assets. *ROA* is measured by earnings before interest, tax, depreciation and amortization scaled by average total assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. *Age* is measured by the natural logarithm of firm age from its incorporation year. *Market risk* is calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Log GDP*, *Credit to private sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

PPP & Non-PPP	Tobin's q					ROA				
	All sample Coef./t (1)	Developed Coef./t (2)	High maturity Coef./t (3)	Medium maturity Coef./t (4)	Emerging-Low maturity Coef./t (5)	All sample Coef./t (6)	Developed Coef./t (7)	High maturity Coef./t (8)	Medium maturity Coef./t (9)	Emerging-Low m Coef./t (10)
Size	-1.834606*	.2411101**	0.3276405	.2942315**	-.3735254**	0.0057788	.0294322**	0.034372	-0.0087469	-0.0087469
Capex/sales	-1.866548	2.59976	1.147838	3.11564	-2.131052	0.6712204	2.248199	1.442678	-0.6596702	-0.6596702
Sales growth	4.277842	17.06958	10.19235	0.8420011	0.3548046	-7.610302	-21.39384	-18.34987	0.0272297	0.0272297
Leverage	-0.009387	0.1160112	0.7848546	0.0278483	0.0088644	0.0052376	.0254112**	.1928292***	0.0103064	0.0103064
Age	-0.1794901	0.8807271	1.012663	0.2845047	0.1120777	1.309854	2.17557	4.906647	1.039728	1.039728
Market risk	0.0287486	0.0270902	0.1796682	0.0235967	0.4562408	-0.0031961	-0.0047146	-.3782257***	0.0005891	0.0005891
PPP	0.7656043	1.30298	0.3686311	1.22377	0.539748	-0.9169578	-1.50186	-14.26016	0.2075149	0.2075149
Log GDP	0.195436	.4673202*	0.4333143	.4532445*	-0.171584	-0.0008992	0.0193127	-0.0282339	0.0269751	0.0269751
Credit to private sector	0.5628041	1.860669	0.6670659	1.775654	-0.2085101	-0.0296262	0.614913	-0.5806413	0.8260118	0.8260118
Country dummies	-0.1133897	-0.0663424	-0.3416993	0.0870484	-0.1709479	-0.0120906	-0.0025463	-0.0101853	0.0098819	0.0098819
Industry dummies	-1.055668	-0.7987691	-1.506583	1.179644	-0.677671	-1.31172	-0.3135557	-0.7540625	1.226389	1.226389
Constant	0.0166128	0.1620603	-0.079641	-.1888035*	-0.2995482	-0.0037987	0.0009346	-0.03566	.0310424*	.0310424*
	0.1011637	1.52529	-0.2285002	1.772987	-0.7422034	-0.2476769	0.0572156	-1.157653	1.921977	1.921977
	0.1621844	-.9371045**	-1.344805	-1.458323**	0.5632497	-0.0407087	-.1225074**	-0.0472226	-0.0154392	-0.0154392
	0.3692391	-2.134303	-1.025682	-3.057226	0.603185	-1.106288	-2.721208	-0.665789	-0.2847065	-0.2847065
	-0.000981	0.0009818	0.0118537	0.0002956	-0.0329234*	-0.0002832	-0.0000516	-0.0007617	0.0000541	0.0000541
	-0.3024635	0.4721016	1.155939	0.1882829	-1.852051	-1.131348	-0.2925186	-1.482136	0.349547	0.349547
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
r2	0.6457105	10.82798**	12.17064	18.2052**	-3.348372	0.637377	1.421347**	0.6837992	0.3823593	0.3823593
N	0.1270139	2.152587	0.8617289	2.991836	-0.3041113	1.488883	2.747865	0.88	0.5552782	0.5552782
	12.29	33.05	41.63	20.87	23.53	13.07	23.73	72.76	10.76	10.76
	1264	867	207	660	397	1252	860	207	653	653

Table XV: Firm Value: PPP and Non-PPP Firms in 5-year Post-PPP Period–Different-Economy Comparison

This table indicates in which kind of economies experience the higher differences on firm value between PPP and non-PPP in the 5-year post-PPP period. Two firm-performance variables are *Tobin's q* and *ROA*. *Tobin's q* is measured by the market to book value of total assets. *ROA* is measured by earnings before interest, tax, depreciation and amortization scaled by average total assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. *Age* is measured by the natural logarithm of firm age from its incorporation year. *Market risk* is calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Economies* is a dummy variable which takes value 1 for firms in developed economies, else zero for firms in emerging economies. *High low, High medium, Medium low* are dummy variables to compare firm performance in different mature PPP markets. *Log GDP, Credit to private sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

	Tobin's q				ROA			
	Developed vs Emerging economies Coef./t (1)	High vs Low maturity Coef./t (2)	Medium vs Low maturity Coef./t (3)	High vs Medium maturity Coef./t (4)	Developed vs Emerging economies Coef./t (5)	High vs Low maturity Coef./t (6)	Medium vs Low maturity Coef./t (7)	High vs Medium maturity Coef./t (8)
Size	-.1864301*	-.3300523**	-.1687965*	.2553398**	0.0052824	-0.003535	-0.0034815	.0349318**
Capex/sales	-1.901882	-2.140696	-1.659108	2.68951	0.6142833	-0.3094038	-0.4181261	2.642508
Sales growth	.3612029***	.3341358**	0.009437	2.209949***	-.0564334***	-.0373413***	-0.0118689	-.2312901***
Leverage	4.203473	2.874393	0.1015853	16.98965	-7.677607	-4.407878	-1.563657	-21.49325
Age	-0.0072297	0.0065374	-0.0017996	0.1171759	0.0053996	0.0023012	0.0039761	.0251748**
Market risk	-0.1382445	0.0876874	-0.0360813	0.8892213	1.351108	0.4462827	1.066503	2.159067
PPP	0.0337696	0.7903353	0.0339376	0.0280441	-0.0026662	-.3477946***	0.0014623	-0.0041266
Economies	0.899375	1.527825	0.8814919	1.345292	-0.7642269	-9.476808	0.4472132	-1.325561
PPP*Economies	0.188161	0.1990407	0.0266397	.4735107*	-0.0022345	0.0366797	0.0041612	0.0202199
High low	0.543158	0.321284	0.0696617	1.883258	-0.0737193	0.7960713	0.1319557	0.6480012
PPP*High low	-0.1024952	-0.2894432	-0.0244244	-0.0688516	-0.0111781	-0.0057716	-0.0070272	-0.0030526
Medium low	-0.9537412	-1.484004	-0.2120561	-0.8279183	-1.212254	-0.3826525	-0.7280274	-0.3766897
PPP*Medium low	-0.3692282	-0.2660935	-0.4404638	.2007967*	-.044018*	-.0544538*	-0.032612	0.0210414
High medium	-1.303636	-0.716922	-1.539571	1.679686	-1.650229	-1.913621	-1.326587	1.147095
PPP*High medium	-0.3628227				-.0964061*			
Medium high	-0.6005398				-1.764106			
PPP*Medium high	.5748182*				.0597716*			
High medium	1.668556				1.841146			
PPP*High medium		-0.762706				0.0165368		
Medium low		-0.6935167				0.2046092		
PPP*Medium low		0.4178294				0.0628923		
High low		0.6527001				1.287431		
PPP*High low			-1.243921				-0.0004076	
Medium low			-1.596592				-0.0064149	
PPP*Medium low			.688241*				.0635153**	
High medium			1.878432				2.018305	
PPP*High medium				-0.7489238				-1.364469**
Medium high				-1.413156				-2.205729
PPP*Medium high				-0.1740171				-0.0856225
High low				-0.7083665				-1.298471
PPP*High low								
Log GDP	0.1607802	0.3555853	0.0943869	-.9459871**	-0.0405602	0.0218592	-0.0298727	-1.261603**
Credit to private sector	0.3667796	0.4809219	0.1994548	-2.15283	-1.103781	0.4080238	-0.7912508	-2.810053
Country dummies	-0.0009563	-0.0045692	-0.0014926	0.0009787	-0.0002797	-.0015989**	-0.0001779	-0.0000544
Industry dummies	-0.294985	-0.4688272	-0.4422018	0.4704919	-1.118179	-2.342208	-0.7024033	-0.3089605
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.9523105	-2.20325	2.680591	11.65455**	0.7262438	0.0353791	0.6154654	1.599285**
r2	0.181373	-0.2594216	0.4790346	2.12631	1.643599	0.0575313	1.377529	2.845775
N	12.93	16.41	14.92	33.19	13.84	26.14	15.55	24.91
N	1264	604	1057	867	1252	599	1045	860

Table XVI: Firm Value: PPP and Non-PPP Firms in 5-year Post-PPP Period– The Effects of Institutional Quality

This table indicates the effects of institutional quality on the differences between PPP and non-PPP in the 5-year post-PPP period. *Tobin's q* is measured by the market to book value of total assets. *ROA* is measured by earnings before interest, tax, depreciation and amortization scaled by average total assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. *Age* is measured by the natural logarithm of firm age from its incorporation year. *Market risk* is calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Political stability*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, *Control of corruption* and *Freedom from corruption* are to capture institutional quality. *Log GDP*, *Credit to private sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

Tobins'q	(1)	(2)	(3)	(4)	(5)	(6)
	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t
Size	-1.1938729*	-1.1927454*	-.2066441**	-.2050731**	-.1885256*	-.1896005*
Capex/sales	-1.93792	-1.924808	-2.069205	-2.088506	-1.878147	-1.897925
Sales growth	.3603126***	.3669746***	.3583315***	.3564524***	.3604149***	.3528128***
Leverage	4.145859	4.218922	4.135367	4.153654	4.138279	4.058236
Age	-0.0310128	-0.0455932	-0.04473	0.0043372	-0.0360437	-0.0338487
Market risk	-0.2855537	-0.4196339	-0.4124531	0.0818424	-0.3313344	-0.3117638
PPP	0.0348872	0.0287892	0.0307159	0.0311438	0.0305995	0.0313422
Political stability	0.9238285	0.7638895	0.8196307	0.834211	0.8106679	0.8334886
PPP=1 # Political stability	0.167819	0.1911242	0.177957	0.300145	0.1714404	0.1591151
Regulatory quality	0.4745239	0.5397264	0.504735	0.8546351	0.4825178	0.4502491
PPP=1 # Regulatory quality	-0.091488	-0.1076531	-0.0945686	-0.0926136	-0.1047436	-0.1005306
Control of Corruption	-0.8351187	-0.9838652	-0.8661389	-0.8607872	-0.9562376	-0.9184044
PPP=1 # Control of corruption	-0.1418636	-0.2934595	-0.2800678	-0.6599427	-0.2531924	-0.2755983
Freedom from Corruption	-0.7830013	-1.202007	-1.264473	-1.450532	-0.9855493	-1.201763
PPP=1 # Freedom from corruption	-1.4986749**		-1.008398***			
Government Effectiveness	-1.964317		-2.85			
PPP=1 # Government effectiveness	.4071521**	0.3674209	.2986503*			
Rule of law	2.047841	1.14	1.958017			
PPP=1 # Rule of law		.344416*		-0.0273728**		
Credit to private sector		1.693023		-2.14		
PPP=1 # Credit to private sector				0.0107326		
Country dummies				1.587403		
Industry dummies					-0.1458933	
Log GDP					-0.33	
Constant					0.2588269	
r2					1.340637	
N						0.7998381
						1.28
						.3305673*
						1.81404
	0.0630211	0.1360222	0.2386242	0.1435798	0.1966594	0.1409888
	0.1369786	0.3023979	0.5333105	0.3278536	0.4370576	0.313853
	-0.001439	-0.0010815	-0.0036132	-0.0022632	-0.0012876	-0.0012959
	-0.4274678	-0.3214998	-1.03682	-0.6786512	-0.3811989	-0.3853213
	2.33342	0.2216482	1.991657	3.258422	0.4810201	-0.5356879
	0.4319261	0.0426068	0.3817704	0.6249255	0.0903215	-0.1022337
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
r2	12.86	12.86	13.86	13.3	12.84	12.85
N	1228	1228	1228	1228	1228	1228

Table XVII: Firm Value: PPP Private Sector Firms in 5 Years Post and Pre PPP Investments.

This table compares PPP firms in 5 years after and before PPP investments. Two firm performance variables are *Tobin's q* and *ROA*. *Tobin's q* is measured by market to book value of total assets. *ROA* is measured by earnings before interest, tax, depreciation and amortization scaled by average total assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. *Age* is measured by the natural logarithm of firm age from its incorporation year. *Market risk* is calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *LogGDP*, *Credit to private sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

	Tobin's q					ROA				
	All sample Coef./t	Developed Coef./t	High maturity Coef./t	Medium maturity Coef./t	Emerging-Low maturity Coef./t	All sample Coef./t	Developed Coef./t	High maturity Coef./t	Medium maturity Coef./t	Emerging-Low maturity Coef./t
Size	-.1989444**	.3080858*	0.0501414	.3816489***	-.4538483***	0.0027322	-0.0043605	-.0478607**	0.0015979	0.0008111
Capex/sales	-2.177996	1.812832	0.0508592	4.098284	-4.58207	0.5226554	-0.4055895	-2.126598	0.1275111	0.13223
Sales growth	0.4136661	0.1831479	0.2349219	0.4962371	0.4907404	-1.00078	-0.7978932	-0.3339598	0.0901435	-0.78672
Leverage	0.0685778	0.0144953	-0.7775616	0.1179258	.9101449*	-0.0174804**	-0.0128735	-.1545331***	-0.0110761	-0.05972
Age	0.4803486	0.096204	-0.8435268	1.381149	1.654819	-2.093685	-1.601785	-3.393502	-1.297202	-1.5948
Market risk	0.1321977	0.3182224	1.226323	-0.136754	0.3068854	0.0201584	0.0289238	.1091812**	0.0258543	.04282
Post PPP	0.4985762	0.8139285	0.607101	-0.6210475	0.8837219	1.320308	1.243602	2.422395	0.954235	1.8857
Log GDP	0.0819025	0.0223886	0.1500489	0.0471741	-0.016879	0.0066427	0.0085638	0.0146651	0.0035335	0.00422
Credit to private sector	0.8740458	0.1729752	0.3217409	0.5827822	-0.1294207	1.254469	1.272258	1.424679	0.4224951	0.49355
Constant	.1273382*	.1959892**	0.2180667	.1659718**	-0.1929565	0.0010811	0.0068882	-0.0056781	.0103514*	-0.18384
Country dummies	1.651127	2.060391	0.5355156	2.90843	-1.358398	0.2482739	1.382594	-0.6315692	1.745979	-1.9311
Industry dummies	0.2720179	0.0819299	-2.097221	0.8328116	0.483592	-.0521549**	-.072334*	-0.0294683	-0.0865732	-0.01888
r2	0.7782665	0.1135559	-0.8705592	1.62597	1.195277	-2.618285	-1.816093	-0.5432689	-1.502796	-0.70415
N	.0055315**	.0045868*	0.0230237	.0028226*	0.0001966	-0.0002598**	-0.0000799	-0.0002607	-9.71E-06	-0.0008751
	2.360197	1.674927	1.283509	1.813336	0.0353561	-1.983634	-0.5745983	-0.6502411	-0.0622369	-2.2598
	-1.716672	-1.998062	22.60249	-11.57695*	-4.169234	.794332***	1.05449**	0.9044582	1.253803*	0.41190
	-0.4220249	-0.2438398	0.87	-1.800505	-0.8488651	3.415138	2.345301	1.54603	1.74764	1.74764
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	15.62	15.4	10.06	20.77	49.35	26.3	19.7	37.16	16.53	29.4
	1291	862	198	664	429	1286	857	197	660	4

Table XVIII: Firm value: PPP Private Sector Firms in 5 Years Post and Pre PPP Investments in Different-Economy Comparison

This table indicates which kind of economies experience the higher differences on PPP firm value between post and pre-PPP period. Two firm performance variables are *Tobin's q* and *ROA*. *Tobin's q* is measured by market to book value of total assets. *ROA* is measured by earnings before interest, tax, depreciation and amortization scaled by average total assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. *Age* is measured by the natural logarithm of firm age from its incorporation year. *Market risk* is calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Economies* is a dummy variable which takes value 1 for firms in developed economies, else zero for firms in emerging economies. *High low, High medium, Medium low* are dummy variables to compare firm performance in different mature PPP markets. *Log GDP*, *Credit to private sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

	Developed vs Emerging economies	High vs Low maturity	Medium vs Low maturity	High vs Medium maturity	Developed vs Emerging economies	High vs Low maturity	Medium vs Low maturity	High vs Medium maturity
	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t
Size	-.2221737**	-.3928938**	-.2319141***	.3069285*	0.0018287	0.0018671	0.0028946	-0.0045572
Capex/sales	-2.433107	-2.858884	-3.385925	1.797444	0.3488217	0.3072776	0.5235282	-0.4228767
Sales growth	0.0357339	0.048397	0.053155	0.0451494	-0.0062594	-0.0061917	-0.0053233	-0.0090291
Leverage	0.3402267	0.3461987	0.5993172	0.2163267	-1.078808	-1.024186	-0.7623122	-0.8721943
Age	0.0150789	0.0104331	0.0097698	0.0422009	0.0007721	0.0004057	0.0004553	.0258668**
Market risk	0.4280604	0.1976724	0.3801535	0.2157149	0.3913247	0.1735459	0.2208445	2.564219
Post PPP	0.0519679	-0.2169498	0.14357	0.0171812	-.0179636**	-.0907374**	-.0164678*	-.0132889*
Economies	0.3652689	-0.4541198	1.320106	0.1138871	-2.153887	-3.058433	-1.882762	-1.653343
High low	0.3015041	0.4461068	0.1929724	0.321292	.0267199*	.0340215*	0.0267867	0.0279331
High medium	1.11943	0.9589029	0.9323439	0.818467	1.714573	1.656882	1.597969	1.198631
Medium low	0.0526073	0.0245617	0.0701801	0.0240611	0.0056494	0.0091822	0.0028478	0.0083279
Post PPP*High low	0.5610409	0.1531653	0.9425456	0.1856563	1.063708	1.304257	0.475688	1.23725
Post PPP*High medium	-.2593367*	-0.2142444	-.2355406**	.1755576*	-0.0128567	-.0144098*	-.0140053*	.0093808*
Post PPP*Medium low	-1.876386	-1.100032	-2.286299	1.714899	-1.636176	-1.670798	-1.678023	1.770233
Post PPP*Medium medium	-0.7017941				-0.0265185			
Post PPP*High medium	-1.209998				-0.7604165			
Post PPP*Low maturity	.486837***				.017374**			
Post PPP*Medium maturity	3.367401				2.135574			
Post PPP*High maturity		-1.460697				0.0007257		
Post PPP*High low		-1.598159				0.0177091		
Post PPP*High medium		.4366571***				0.0139458		
Post PPP*Medium low		3.921506				1.157999		
Post PPP*Medium medium			-1.350711**				0.012771	
Post PPP*High low			-2.862157				0.3327983	
Post PPP*High medium			.4366571***				0.0212896***	
Post PPP*Low maturity			3.921506				2.367946	
Post PPP*Medium maturity				0.0021575				-0.0382782
Post PPP*High maturity				0.0023211				-0.6967535
Post PPP*Low maturity				0.1055027				-0.0133947
Post PPP*Medium maturity				0.5376811				-1.368379
Post PPP*High maturity				0.0328333	-0.0429826**	-0.0270693	-0.042272*	-0.0627811
Log GDP	0.5196009	0.171196	.5923151**	0.0328333	-2.109679	-1.128785	-1.898098	-1.552189
Credit to private sector	1.459837	0.3167429	2.14652	0.0449036	-0.0002633**	-0.0006631**	-0.0002113	-0.0000454
Constant	.0054269**	0.0081737	.0039386**	0.0043416	-2.013795	-2.391671	-1.452741	-0.3216848
Country dummies	2.325121	1.290504	2.172329	1.561695	.7098795**	.5090489*	.6928548**	.9850788**
Industry dummies	-4.00892	1.246926	-4.271958	-1.443226				
r2	-0.9417815	0.2001106	-1.302417	-0.1590539	2.904762	1.836738	2.616139	1.970404
N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	15.82	20.45	30.36	15.55	26.84	21.32	30.08	19.85
	1291	627	1093	862	1286	626	1089	857

Table XIX: Firm Value: PPP Firms in the Post and Pre PPP periods The Effects of Institutional Quality

This table indicates the effects of institutional quality on the differences of PPP firms in between post and pre PPP periods. *Tobin's q* is measured by market to book value of total assets. *ROA* is measured by earnings before interest, tax, depreciation and amortization scaled by average total assets. *Size* is measured by the natural logarithm of total assets. *Leverage* is calculated by total debt divided by total assets. *Capex/sales* is calculated by capital expenditure divided by sales to measure investment intensity. *Sale growth* is measured as the average growth over 3 years in net sales to capture growth opportunities. *Age* is measured by the natural logarithm of firm age from its incorporation year. *Market risk* is calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before. *PPP* is a dummy variable which takes value 1 for firms invested in PPP projects, else zero for firms which are matched by industry and firm size. *Political stability*, *Government effectiveness*, *Regulatory quality*, *Rule of law*, *Control of corruption* and *Freedom from corruption* are to capture institutional quality. *Log GDP*, *Credit to private sector* and *Country dummies* are to control for country-level effects. *Industry dummies* are to control industry effects. \*\*\*, \*\*, \* indicate significant at 1%, 5% and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t	Coef./t
Size	-.2164828**	-.2505815**	-.2587393**	-.2452762**	-.2285835**	-.235604**
	-2.35188	-2.705086	-2.782539	-2.672514	-2.412262	-2.543273
Capex/sales	0.0428167	0.038299	0.0330567	0.0420499	0.0356343	0.0721976
	0.4035065	0.3619346	0.3121282	0.4000826	0.3360269	0.6813154
Sales growth	0.0244719	0.0363808	0.0285486	0.0288447	0.0156713	0.0210152
	0.6923726	1.027165	0.8114972	0.7971205	0.439776	0.5962248
Leverage	0.052573	0.0612452	0.0745239	0.0643218	0.0602199	0.0489193
	0.3659444	0.4272766	0.5191083	0.4515033	0.4192202	0.3417866
Age	0.3021116	0.3585632	0.3488436	0.3465169	0.3169189	0.2817157
	1.107938	1.304924	1.266497	1.278073	1.147267	1.027313
Market risk	0.0511279	0.0377136	0.0377165	0.0444666	0.047668	0.0336317
	0.5410333	0.3979777	0.3976243	0.4732454	0.4999932	0.3547137
Post PPP	-0.0828179	-.2940018**	-.2295177**	-.7334584***	-.3131776**	-0.17524
	-0.8634215	-2.422542	-2.022877	-3.372612	-2.226818	-1.510145
Political stability	0.0899831					
	0.4715204					
Post PPP=1 # Political stability	.3387768***					
	3.843129					
Regulatory quality		-0.2948382				
		-1.3				
Post PPP=1 # Regulatory quality		.4074384***				
		4.502985				
Control of Corruption			-0.4441587			
			-1.7			
Post PPP=1 # Control of corruption			.2919543***			
			4.317927			
Freedom from Corruption				-0.0071994		
				-1.06		
Post PPP=1 # Freedom from corruption				.0126341***		
				4.240808		
Government Effectiveness					-0.0056521	
					-0.47	
Post PPP=1 # Government effectiveness					.3433698***	
					3.730151	
Rule of law						1.455004
						3.31
Post PPP=1 # Rule of law						.2589748***
						3.301084
Log GDP	.6856627*	.7045237*	.662848*	.6695102*	.6369725*	0.4839961
	1.842464	1.903323	1.781849	1.845069	1.714078	1.302666
Credit to private sector	.0063007**	0.0031744	0.003014	.0040231*	.0044635*	0.0038081
	2.6419	1.286697	1.214001	1.671917	1.865052	1.596713
Constant	-6.95791	-6.213848	-5.212078	-5.753994	-6.046004	-6.562679
	-1.591256	-1.445755	-1.184808	-1.349884	-1.396408	-1.524824
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
r2	16.97	16.75	16.5	16.27	16.47	16.47
N	1259	1259	1259	1259	1259	1259

## 6. Conclusion

PPPs has been increasingly common to address the growing infrastructure gap in the world. PPPs come with the benefit of readily pledgable government assets that can help the private sector invest in large infrastructure projects which otherwise increase their investment–cash flow sensitivity.

We test whether this inherent benefit really reduces the underinvestment problem, which is evident from the reduction in the investment–cash flow sensitivity of private sector firms. We use the sample of 625 PPP partnering private firms (1980-2015) from nine economies with varying degrees of economic and PPP development to test this conjecture. We also try to understand whether changes in investment–cash flow sensitivity are driven by underinvestment or overinvestment. This is important as any reduction in the investment–cash flow sensitivity does not guarantee reduction in the underinvestment problem. If the reduction is experienced mainly by a subgroup of firms that have low growth opportunities, then it reflects a potential overinvestment problem.

In addition to that, our study try to understand the influence of institutional quality on PPP benefits to partnering private sector firms. Existing literature has been debatable to tease out whether the "law-finance-growth" nexus or the "political-tie" hypothesis are more dominant in explaining firms' financial benefits under effects of institutional quality. One limitation of the existing studies is that they use general corporate investment which may not be directly aligned with political interference in some cases.

Our study contribute to the literature by using the sample of Public-Private Partnerships in which political intervention has more opportunities to be activated as trying to secure political connections help private sector to successfully award government large infrastructure projects and receive numerous government guarantee to operate smoothly high-risk assets. By doing this, we find that the nature of firms that undertakes PPP investments varies. While private sector firms in economies with low institutional quality opt for PPPs to alleviate capital constraints commonly attributed to underinvestment, those in economies with high institutional quality opting for PPPs to solve the problem of overinvestment caused by abundant cash flow. In the long run, the benefits of lower capital constraints through PPP investment are more significant in the economies with high institutional quality. We conduct the robustness tests by using firm value as the measurement of private sector firms' benefits from PPPs. The results again confirm that the "law-finance-growth" hypothesis seem to be predominant to support for the private sector firms' financial benefits through PPP investments.

In summary, my research highlights that PPP investments made by private sector firms are generally perceived as value enhancing investments by investors. However, the real benefits associ-

ated with reduced reliance on internal cash flows, and consequently, the reduced underinvestment problem of private sector firms in emerging markets and increase firm value is not that straightforward. Such benefits are affected by the extent of institutional quality of the country. Our research provides new guidance on the direction and viability of PPP-partnering private sector firms in varying degree of market maturity and institutional quality.

## Appendix

### A Variable Definition

Table A1: Variable Definition

<b>Firm-level variables</b>	<b>Definition</b>	<b>Sources</b>
1. <b>Investment</b>	the changes in gross fixed assets, divided by the previous years' fixed assets	Datastream
2. <b>Cash flow</b>	income before extraordinary items, depreciation and amortization, divided by the previous years' fixed assets	Datastream
3. <b>Size</b>	the natural logarithm of total assets	Datastream
4. <b>Leverage</b>	total debt divided by total assets	Datastream
5. <b>Age</b>	measured from the year of a firm's incorporation	Datastream
6. <b>Tobins'q</b>	the market value of assets (market capitalization + liabilities' market value) divided by the book value of assets (common stock's book value + liabilities' book value)	Datastream
7. <b>Total bank loans/sales</b>	total short term and long term bank loans of private sector firms divided by sales	Annual reports, Datastream
8. <b>Interest coverage</b>	earning before interest and tax divided by interest expense on debts	Datastream
9. <b>Insider ownership</b>	the percentage of shares held by CEO, chairman, executive directors, non-executive directors and all including their family	Annual reports, Shareholding patterns
10. <b>ROA</b>	earnings before interest, tax, depreciation and amortization scaled by average total assets	Datastream
11. <b>Capex/sales</b>	capital expenditure divided by sales to measure investment intensity.	Datastream
11. <b>Sale growth</b>	the average growth over 3 years in net sales to capture growth opportunities	Datastream
12. <b>Market risk</b>	calculated by estimating the market model (one factor) on the monthly returns of firms in the five years before	Datastream
<b>Government reliance variables</b>	<b>Definition</b>	<b>Sources</b>
1. <b>Public equity</b>	the proportion of total PPP investment belongs to the government, is to capture government equity participation in PPP projects	The World Bank's PPI Project database
2. <b>Political connection</b>	a dummy variable which takes value 1 for firms that have chairman and executive directors being former or current officers in the governments, the parliament and the military	Annual reports rajyasabha.nic.in, loksabha.nic.in
<b>Institution quality variables</b>	<b>Definition</b>	<b>Sources</b>
1. <b>Accountability</b>	perceptions of the 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	Kaufmann et al. (2011)
2. <b>Political stability</b>	perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism	Kaufmann et al. (2011)
3. <b>Government effectiveness</b>	perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	Kaufmann et al. (2011)
4. <b>Regulatory quality</b>	perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	Kaufmann et al. (2011)
5. <b>Rule of law</b>	perceptions of the 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	Kaufmann et al. (2011)
6. <b>Control of corruption</b>	perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	Kaufmann et al. (2011)
7. <b>Public uncertainty</b>	a dummy variable taking value 1 when PPPs enter into contracts in the year of general election, else zero	npc.gov.cn, indohistory.com
<b>Country-level variables</b>	<b>Definition</b>	<b>Sources</b>
1. <b>Log GDP</b>	the natural logarithm of Gross Domestic Product in the US dollars	The World Bank (2016)
2. <b>Credit to private sector</b>	financial resources that financial corporations provide the private sector (measured as the percentage of GDP)	The World Bank (2016)

## B PPP Private Sector Firms in the Cross-Country Analysis

Figure B1: PPP Listed Private Sector Firms by Countries and Industries

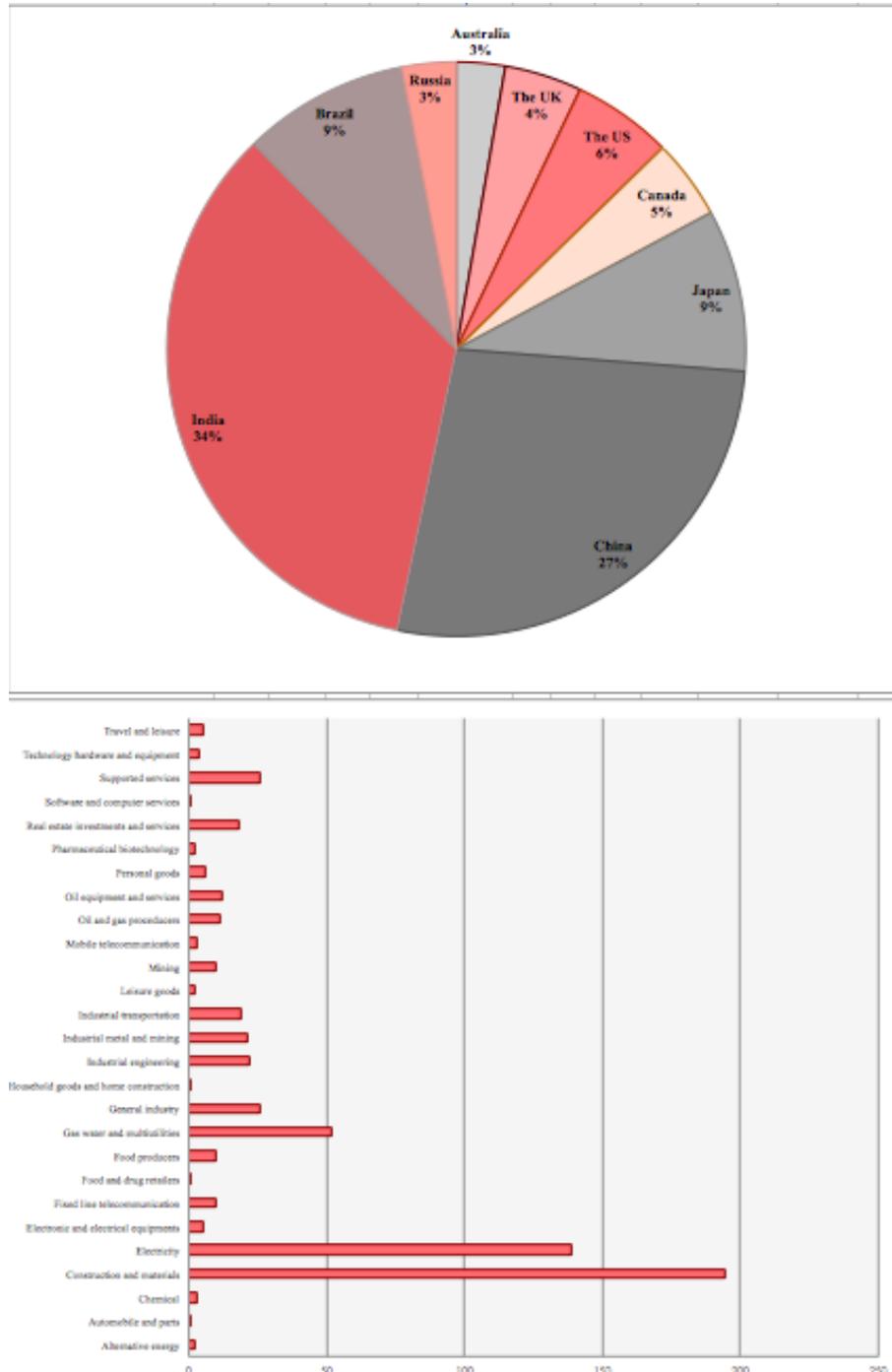


Table B2: Cross-Country PPP Data Sources

Country	Organization	Link
Australia	Infrastructure Australia	<a href="http://infrastructureaustralia.gov.au/policy-publications/public-private-partnerships/index.aspx">http://infrastructureaustralia.gov.au/policy-publications/public-private-partnerships/index.aspx</a>
The UK	HM Treasury and Infrastructure UK	<a href="https://www.gov.uk/government/publications/private-finance-initiative-projects-2013-summary-data">https://www.gov.uk/government/publications/private-finance-initiative-projects-2013-summary-data</a>
The US	The National Council for PPPs Federal Highway Administration	<a href="http://www.ncppp.org/resources/case-studies">http://www.ncppp.org/resources/case-studies</a> <a href="http://www.fhwa.dot.gov/ipd/p3/project_profiles/">http://www.fhwa.dot.gov/ipd/p3/project_profiles/</a>
Canada	The Canadian Council for PPPs	<a href="http://projects.pppcouncil.ca/ccppp/src/public/search-project?pageid=3d067bedfe2f4677470dd6ccf64d05ed">http://projects.pppcouncil.ca/ccppp/src/public/search-project?pageid=3d067bedfe2f4677470dd6ccf64d05ed</a>
Japan	Japan PPI-PPP Association	<a href="http://www.pfikyokai.or.jp/pfi-data/pfi-list_g.html">http://www.pfikyokai.or.jp/pfi-data/pfi-list_g.html</a>
China	The World Bank PPI Project Database	<a href="http://ppi.worldbank.org">http://ppi.worldbank.org</a>
India	The World Bank PPI Project Database	<a href="http://ppi.worldbank.org">http://ppi.worldbank.org</a>
Brazil	The World Bank PPI Project Database	<a href="http://ppi.worldbank.org">http://ppi.worldbank.org</a>
Russia	The World Bank PPI Project Database	<a href="http://ppi.worldbank.org">http://ppi.worldbank.org</a>

## References

- Allen, F., Qian, J. and Qian, M. (2005), 'Law, finance, and economic growth in china', *Journal of financial economics* **77**(1), 57–116.
- Bai, C.-E., Lu, J. and Tao, Z. (2006), 'Property rights protection and access to bank loans', *Economics of transition* **14**(4), 611–628.
- Beck, T., Demirguc-Kunt, A. and Levine, R. (2002), Law and finance: why does legal origin matter?, Technical report, National bureau of economic research.
- Bing, L., Akintoye, A., Edwards, P. J. and Hardcastle, C. (2005), 'The allocation of risk in ppp/pfi construction projects in the uk', *International Journal of project management* **23**(1), 25–35.
- Chan, A. P., Lam, P. T., Chan, D. W., Cheung, E. and Ke, Y. (2010), 'Critical success factors for ppps in infrastructure developments: Chinese perspective', *Journal of Construction Engineering and Management* **136**(5), 484–494.
- Chen, C. J., Ding, Y. and Kim, C. F. (2010), 'High-level politically connected firms, corruption, and analyst forecast accuracy around the world', *Journal of International Business Studies* **41**(9), 1505–1524.
- Claessens, S., Feijen, E. and Laeven, L. (2008), 'Political connections and preferential access to finance: The role of campaign contributions', *Journal of Financial Economics* **88**(3), 554–580.
- Claessens, S. and Laeven, L. (2003), 'Financial development, property rights, and growth', *The Journal of Finance* **58**(6), 2401–2436.
- Cull, R. and Xu, L. C. (2005), 'Institutions, ownership, and finance: the determinants of profit reinvestment among chinese firms', *Journal of Financial Economics* **77**(1), 117–146.
- Dawson, J. F. and Richter, A. W. (2006), 'Probing three-way interactions in moderated multiple regression: development and application of a slope difference test.', *Journal of Applied Psychology* **91**(4), 917.
- Demirgüç-Kunt, A. and Maksimovic, V. (1998), 'Law, finance, and firm growth', *The Journal of Finance* **53**(6), 2107–2137.

- Dobbs, R., Pohl, H., Lin, D., Mischke, J., Garemo, N., Hexter, J., Matzinger, S., Palter, R. and Nanavatty, R. (2013), 'Infrastructure productivity: How to save 1 trillion dollars a year? mckinsey global institute', *McKinsey Co., January* .
- Eggers, W. D. and Startup, T. (2006), *Closing the infrastructure gap: the role of public-private partnerships*, Deloitte.
- Engel, E., Fischer, R. and Galetovic, A. (2010), 'The economics of infrastructure finance: Public-Private Partnerships versus public provision', *EIB Papers* .
- Faccio, M. (2006), 'Politically connected firms', *The American economic review* **96**(1), 369–386.
- Faccio, M. (2010), 'Differences between politically connected and nonconnected firms: A cross-country analysis', *Financial management* **39**(3), 905–928.
- Faccio, M., Masulis, R. W. and McConnell, J. (2006), 'Political connections and corporate bailouts', *The Journal of Finance* **61**(6), 2597–2635.
- Fazzari, S., Hubbard, R. G. and Petersen, B. C. (1988), 'Financing constraints and corporate investment', *Brookings Papers on Economic Activity* .
- Firth, M., Lin, C., Liu, P. and Wong, S. M. (2009), 'Inside the black box: Bank credit allocation in china's private sector', *Journal of Banking & Finance* **33**(6), 1144–1155.
- Gray, S., Harymawan, I. and Nowland, J. (2014), 'Political and government connections on corporate boards in australia: Good for business?', *Australian Journal of Management* p. 0312896214535788.
- Grimsey, D. and Lewis, M. (2004), *Public private partnerships: The worldwide revolution in infrastructure provision and project finance*, Edward Elgar Publishing.
- Hodge, G. A. and Greve, C. (2009), 'Ppps: The passage of time permits a sober reflection', *Economic Affairs* **29**(1), 33–39.
- Hovakimian, G. (2009), 'Determinants of investment cash flow sensitivity', *Financial Management* .
- Hwang, B.-G., Zhao, X. and Gay, M. J. S. (2013), 'Public private partnership projects in singapore: Factors, critical risks and preferred risk allocation from the perspective of contractors', *International Journal of Project Management* **31**(3), 424–433.

- Jensen, M. C. (1986), ‘Agency costs of free cash flow, corporate finance, and takeovers’, *The American economic review* pp. 323–329.
- Jensen, M. C. and Meckling, W. H. (1976), ‘Theory of the firm: Managerial behavior, agency costs and ownership structure’, *Journal of financial economics* **3**(4), 305–360.
- Kaufmann, D., Kraay, A. and Mastruzzi, M. (2011), ‘The worldwide governance indicators: methodology and analytical issues’, *Hague Journal on the Rule of Law* **3**(02), 220–246.
- KPMG (2015), ‘Public private partnerships: Emerging global trends and the implications for future infrastructure development in australia’.  
**URL:** *kpmg.com.au*
- La Porta, R., Lopez-de Silanes, F. and Shleifer, A. (2002), ‘Government ownership of banks’, *The Journal of Finance* **57**(1), 265–301.
- Li, H., Meng, L., Wang, Q. and Zhou, L.-A. (2008), ‘Political connections, financing and firm performance: Evidence from chinese private firms’, *Journal of development economics* **87**(2), 283–299.
- Masulis, R. W., Pham, P. K. and Zein, J. (2011), ‘Family business groups around the world: financing advantages, control motivations, and organizational choices’, *Review of Financial Studies* p. hhr052.
- Maury, B. (2006), ‘Family ownership and firm performance: Empirical evidence from western european corporations’, *Journal of Corporate Finance* **12**(2), 321–341.
- Mian, A. R. and Khwaja, A. I. (2004), ‘Do lenders favor politically connected firms? rent provision in an emerging financial market’, *Rent Provision in an Emerging Financial Market (December 2004)* .
- Miller, R. G. (1966), *Simultaneous statistical inference*, Vol. 196, Springer.
- Myers, S. C. and Majluf, N. S. (1984), ‘Corporate financing and investment decisions when firms have information that investors do not have’, *Journal of Financial Economics* .
- Pawlina, G. and Renneboog, L. (2005), ‘Is investment-cash flow sensitivity caused by agency costs or asymmetric information? evidence from the uk’, *European Financial Management* **11**(4), 483–513.

- Pistor, K., Raiser, M. and Gelfer, S. (2000), 'Law and finance in transition economies', *Economics of Transition* **8**(2), 325–368.
- Porta, R. L., Lopez-de Silanes, F., Shleifer, A. and Vishny, R. W. (1996), Law and finance, Technical report, National Bureau of Economic Research.
- Porta, R. L., Lopez-de Silanes, F., Shleifer, A. and Vishny, R. W. (1997), 'Legal determinants of external finance', *Journal of finance* pp. 1131–1150.
- The Heritage Foundation (2016), 'The index of economic freedom'.  
**URL:** <http://www.heritage.org/index/explore>
- The World Bank (2016), 'Economy & growth and financial sector indicator'.  
**URL:** [data.worldbank.org/indicator](http://data.worldbank.org/indicator)
- Vogt, S. C. (1994), 'The cash flow/investment relationship: evidence from us manufacturing firms', *Financial management* pp. 3–20.
- Vogt, S. C. (1997), 'Cash flow and capital spending: Evidence from capital expenditure announcements', *Financial management* pp. 44–57.
- World Bank (2012), 'Gross domestic product by purchasing power parity'.  
**URL:** [Data.worldbank.org](http://Data.worldbank.org)
- Wurgler, J. (2000), 'Financial markets and the allocation of capital', *Journal of financial economics* **58**(1), 187–214.
- Zhang, X. (2005), 'Critical success factors for public–private partnerships in infrastructure development', *Journal of construction engineering and management* **131**(1), 3–14.