

Are Public-Private Partnerships Fit for Purpose? Evidence from the South Asian Region

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Abstract

Public-private partnership (PPP) is increasingly promoted by advocates as an innovative policy tool for redressing inefficiency in traditional public procurement mechanisms. Many developing nations' governments employ PPPs in an effort to fill infrastructure gaps because they are operating on extremely tight budgets. Governments, operating on extremely tight budgets in many developing countries, also pursue PPPs in attempts to bridge their countries' infrastructure gaps. This research empirically examines the pathways by which PPP agreements in South Asian nations can result in economic gains. Empirical results suggest that an increase in PPP investment positively affects mobile phone subscriptions only, and adversely affects economic growth. Among the other controls used in this study, school enrolment – a proxy for human capital – and trade to GDP ratio both positively affect per capita GDP growth. On the other hand, the government debt to GDP ratio negatively affects it. In terms of access to and quality of services, results are mixed. Government consumption as a percent of GDP exerts a positive effect on all channels leading to economic growth. While trade adversely affects access to electricity, private credit and the ratio of urban to total population positively affect both electricity access and overall infrastructure quality. Population density contributes to increased mobile subscriptions, but reduces the overall quality of infrastructure. Finally, the government debt to GDP ratio adversely affects both mobile subscription and access to basic sanitation services, and rule of law negatively affects mobile subscriptions and quality of infrastructure.

Keywords: PPPs, South Asia, Economic Growth, Infrastructure

1. Introduction

It is widely accepted that infrastructure plays a significant role in stimulating economic growth in developing countries, and South Asia (SA) is no exception. Insufficient economic growth, slow urbanization, and massive infrastructure gaps continue to plague this region, putting future progress in jeopardy (Andrés, Biller, & Dappe, 2013). Hence, donor agencies are increasingly focusing on the requirement for a massively growing infrastructure investment in these economies. According to the World Bank's report, "Reducing Poverty by Closing South Asia's Infrastructure Gap", SA countries would have needed to spend \$2.5 trillion between 2010 and 2020 to close its infrastructure gap. Therefore, donor organizations are placing more emphasis on the requirement for massively growing infrastructure investment in these nations.

However, governments operating on razor-thin budgets, especially in countries experiencing rapid population growth and urbanization, might not be able to make the necessary expenditures to close this gap on their own (Shediac, Abouchakra, Hammami,

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& Najjar, 2008). Moreover, the funding that can be provided by public finances and official development assistance (ODA) seems to be insufficient. Against this backdrop, the public-private partnership (PPP) mechanism emerged as an alternative source of financing for public infrastructure. A PPP can be defined as a long-term agreement between a private party and a government organization for the provision of a public good or service, in which the private party assumes a sizable amount of risk and management accountability. Under this mechanism, development projects are intended to be financed, developed, and managed in a way that would improve their quality, lower risks, and increase profitability.

PPPs have become quite popular since the 1990s as they have been heavily promoted by international organizations, namely the World Bank, IMF, OECD, European Investment Bank, Asian Development Bank, African Development Bank, International Finance Corporation (IFC), and various branches of the United Nations. However, there is no consensus among economists as to the net benefit of PPPs for economic growth. Given the uncertainties surrounding the actual and potential costs of PPPs, it is crucial that these costs are compensated by improvements in service quality, such as efficiency, coverage, and development impact (Jomo et al., 2016).

Advocates regard the PPP mechanism as a strong tool to close the daunting infrastructure gap that exists in less developed countries. They hold that a PPP framework enables risk sharing between public and private sectors and facilitate private finance, design, construction, renovation, operation, maintenance, and perhaps even temporary ownership of an asset in accordance with contract usually stipulated output, all the while maintaining the government's role as a partner (OECD, 2012). By combining public and private resources like finance, experience, expertise, and a delivery-focused approach, these partnerships are traditionally regarded to aid in the expansion and improvement of public services and infrastructure assets.

PPPs are being used by an increasing number of governments around the world to provide infrastructure services. The main drivers identified for governments to join PPP agreements are: attracting private capital to complement public resources or freeing them up for other alternatives (The Reality of Aid, 2011, pp 12); achieving greater efficiency and there by allowing more effective use of scarce public resources; and performing sectoral reforms by restructuring roles, responsibilities, and incentives (ADB, 2008). It is generally agreed that a dearth of domestic funds for filling infrastructure gaps may cause long delays in the implementation of large projects for years or result in their abandonment altogether. Having to stay within debt and deficit constraints can motivate governments to resort to private partnering in an effort to lower debtor to cut their own direct spending. By doing so, they shift their own financial obligations onto the private sector and off their own books, while also creating new user fees as an alternative to raising taxes. Such debt and deficit ceilings may be set forth in international accords, such as the Stability and Growth Pact (SGP), the European Union's legally enforceable diplomatic agreements, or they could be self-imposed by balanced budget legislation

(Loxley & Loxley, 2010, pp. 28-33) or criteria for cyclical balance through the budgetary 'Golden Rule', which asserts that the Government can borrow solely to fund investment and not current spending, like in the UK (McQuaid, 2010, p. 30).

Advocates claim that a successful PPP arrangement can improve competitiveness and create an environment that is conducive to private participation in the delivery of essential infrastructure services. Additionally, it may have a good budgetary impact by reducing government spending while boosting tax revenues. (Lammam, MacIntyre, & Berechman, 2013; Van Herpen, 2002). Hence, one would expect that more investment in PPPs should help catalyse economic development.

PPPs are generally substantiated by the fact that they contribute to efficiency gains that are likely to surpass the higher costs of private financing, easing state budgets, which is particularly crucial in countries with strict fiscal limitations. It is asserted that PPPs substantially lower the government's upfront expenses in the provision and upkeep of public facilities and that they improve public infrastructure and services by encouraging private sector innovation (Heald & Geaughan, 1997; Gaffney, Pollock, & Shaoul, 1999; Glaister, 1999). The possible advantages of PPPs, according to proponents, include access to private financing, more focused goals, innovation, flexibility, better planning, incentives for competitive bids, and higher value for money (Spackman, 2002; Nijkamp et al., 2002). They also believe that the PPP mechanism would eventually compensate for the lost benefit of full state provision, and consumers will be in a better off position than they were in the past. In summary, proponents assert that PPPs would result in increased efficiency and high-quality services, whereas public sector administrations typically see PPPs as a chance to construct infrastructure and acquire public services without incurring debt or imposing undue strain on state budgets.

PPPs, as funding methods, have, however, generated a great deal of controversy, mostly due to worries that the public return on investment is smaller than returns for the private donor. Critics see PPPs in a much less benign light, as a means for the private sector to take over the delivery of publicly provided services. To the Canadian Union of Public Employees (CUPE), they amount to "privatization by stealth" (CUPE, 1998). As described above, proponents claim that PPPs will result in increased efficiency and higher-quality services, while the attraction for the private sector is that it receives an annual rent payment from the public sector in exchange for using infrastructure, which it can use to pay off debt, cover expenses, and boost profitability (Loxley, 2012). By expanding private sector participation in the field of public service, PPPs effectively encourage the increased commercialization of public services (ibid).

Opponents also claim that PPPs may not improve the availability of funds because the payments made by public to the private sector under lease agreement constitute a type of debt, and private borrowing costs are usually higher than those of the public sector. Moreover, the competitive bidding process, said to be important in PPPs, is often flawed in developing countries with few bidders, and PPP contracts are frequently renegotiated. According to critics, PPPs are nothing more than covert borrowing by the public sector while giving long-term governmental guarantees of profits to private businesses. Thus,

there is rising concern that taxpayers may not get the best value for their tax money through PPPs, despite the increasing trend toward PPPs around the world. Given these divergent views, it is imperative to address the question '*Are PPP models fit for the purposes asserted by proponents?*'

This paper reviews relevant theoretical and empirical literatures to assess the degree to which PPPs support the objectives put forward by their proponents. In particular, the study examines whether PPPs in SA countries have an impact on stimulating economic growth, ensuring increased access of end-users to the service, and improving the quality of services provided. Based on the empirical findings, policy recommendations are provided regarding the efficacy of PPPs.

The paper is structured as follows. Section 2 reviews the relevant literature. In Section 3, the methodology of the study is discussed together with the data, variables, conceptual framework, and econometric model. The empirical findings and discussion are presented in section 4, while section 5 concludes the paper.

2. Literature Review

There is broad consensus among diverse groups and individuals regarding the importance of infrastructure investment for accelerating economic growth and achieving sustainable development. Infrastructure investment and economic growth have been found to be positively correlated, according to endogenous growth models (e.g., Barro, 1990; Futagami, Morita, & Shibata, 1993). It is argued that the PPP mechanism can be a better alternative to direct government spending in meeting infrastructure needs, as it is presumed to allow for improved risk allocation between public and private entities and allow the private finance, planning, renovation, construction, service, maintenance and temporary ownership of an asset in line with some specified output, all the while keeping the government as a partner.

As the PPP approach lacks a long history, there are only a few empirical researches on the economic effect of PPPs. Moreover, these few studies present mixed views. For instance, Lee et al. (2018) observed that a higher PPP investment to GDP ratio enhanced access to and the quality of infrastructure services and came to the conclusion that economic growth might potentially be higher. Trujillo et al. (2002) identified some positive, although not impressive, effects of private sector involvement in utilities and transportation on GDP per capita in Latin America. Using the same database, but after controlling for public infrastructure spending, Rhee and Lee (2007) found an adverse, although not statistically significant, effect of PPP investment on GDP per capita. Meanwhile, Kim et al. (2011) demonstrated that South Korea's economy grew by about 0.2% in 2008 due to an increase in capital spending from PPP investments.

The main argument in favour of PPPs is the potential for improvement in service delivery and efficiency relative to traditional procurement. This is due to the expectation that PPPs will assure the best possible usage of the private sector's expertise, innovation, and technology, which promotes economic growth (de Bettignies & Ross, 2004; Davies & Eustice, 2005; European PPP Expertise Centre, 2015; Iossa & Martimort, 2015).

As bundling PPPs helps reduce the life-cycle expense of a project, PPPs guarantee value for money (Davies & Eustice, 2005; Iossa & Martimort, 2015). Of course, the outcome can vary significantly depending on the choice of the discount rate. Due to the fact that PPPs often have longer financial lifespan than traditionally procured public projects (Reynolds, 2007), using high rates of discount greatly reduces the present value of these costs when compared to using low rates, favouring the PPP in terms of value for money.

Romero (2015), however, argues that evidence in favour of efficiency gains is unconvincing. New institutional economics claims that monitoring costs are likely to fall under the PPP mechanism since workers will have less opportunity and incentive to shirk their responsibilities (Williamson and Masten, 1999). But PPPs may actually incur new forms of monitoring costs, such as ensuring that contractual agreements are adhered to. The additional bureaucratic, technical, and legal costs of organizing a PPP can be substantial, and need to be taken into account when judging the efficiency of that option. It is unlikely that partners will be entirely open in negotiations, meaning that the full information required for efficient markets is instead replaced by asymmetric and incomplete information, which has an efficiency cost. This may lead to what economists call “adverse selection” or “moral hazard”, in which a partner takes advantage of weaknesses in the contract (Parker and Hartley, 2003, pp.99–100).

It might therefore be claimed that empirical evidence in favour of prospective economic benefit is very thin, notwithstanding theoretical justifications (Lee et al., 2018). PPPs may generate substantial fiscal risk and uncertainty due to their long-term and complicated nature. Romero (2015) claims that the influence of PPPs on development outcomes is inconsistent and considerably varies between sectors, due in part to the fact that PPP initiatives need to be commercially viable in order to draw in private partnering. The research indicates that PPPs have generally been more costly than conventional public procurement while also failing to deliver the desired improvement in service quality, including its efficiency, coverage, and development impact (Jomo et al., 2016).

PPPs are particularly unlikely to offer efficiency gains when it comes to social infrastructure, like schools and hospitals, where the quality of the services is largely based on the investment made in human capital. For instance, PPPs in the healthcare sector, especially those involving philanthropy and donor organizations, have been referred to as “a double-edged sword” by Joseph (2014, p. 6) because “although they are able to provide large amounts of money, they do not allow for a holistic view of the healthcare concerns faced by a country”.

Thus, given the discussion above it is not unexpected that PPPs are yet to play an important catalytic for investment in some key sectors for economic growth. Finally, it is worth highlighting two intuitive observations by Trebilcock and Rosenstock (2015, p 342-343) regarding key arguments in favour of PPPs:

- i. “The notion that PPPs effectively permit a government to build infrastructure where it would otherwise lack the fiscal capacity must be viewed cautiously as it may invoke fallacious reasoning. Where the government permits a project to be delivered by a private proponent, and the proponent earns a return by charging

user fees, the state foregoes the future revenue stream. This delivery method thus comes with a cost.”

- ii. “The suggestion that PPPs can circumvent government fiscal constraints may also be based on problematic accounting practices. PPP arrangements, where the state pays a private proponent to deliver the project over the life of the contract (rather than user fees), creates a long-term liability on the state. ...Clearly, masking government liabilities do not reduce them..., nor is it transparent.”

3. Methodology

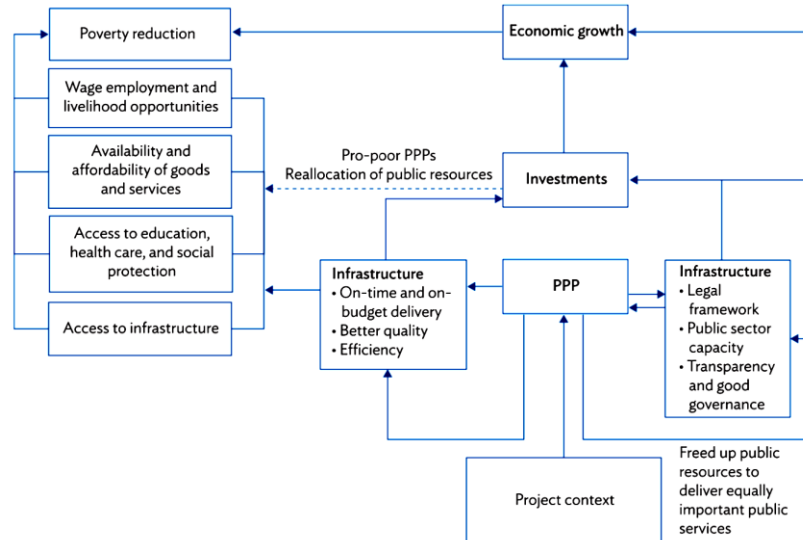
3.1 Data

Data used in this study were collected from secondary sources, including the World Bank PPI Project Database, Worldwide Governance Indicators (WGI), World Development Indicators (WDI), and various relevant published materials. A balanced panel data set for five SA countries—Bangladesh, India, Pakistan, Sri Lanka and Nepal, —covering the years 1995 to 2019 was employed for the regression analysis. Afghanistan, Bhutan, and the Maldives were not included in the analysis on account of insufficient data.

3.2 Theoretical Background

There is consensus that appropriate infrastructure improves economic productivity and quality of life, which then promotes more inclusive and rapid economic growth. PPPs are being used to deliver a variety of public goods and services, such as roads, bridges, ports, water treatment facilities, schools, and hospitals, which could help spur economic growth. Figure 1, taken from Lee et al. (2018), shows the different channels through which PPPs can affect macroeconomic performance.

Figure 1: Public-Private Partnership–Economic Growth–Poverty Nexus



Source: Lee et al. (2018)

PPPs are increasingly being adopted to improve infrastructure and spur economic growth necessary in both developed and developing countries. Proponents hold that PPPs enable governments to allocate public funds to more productive sectors while leveraging private capital into areas that require additional funding or that might be facing an adverse fiscal balance. Advocates claim that more PPPs boost GDP growth because they add more capital into the market and generate long-term employment. The Asian Development Bank (ADB, 2008) asserted that, if effectively designed, PPPs have the potential to mobilize previously unexploited local, regional, and/or global private sector capital in pursuit of investment opportunities that would, in turn, foster economic growth. However, in different sectors PPPs have had mixed outcomes, and there have been cases where things went wrong and governments were to purchase back their assets at considerable losses to prevent market failure (Chua et al., 2012). In reality, the optimism about PPPs depends, especially, on the region's efforts to further enhance its institutional and technical capability to deal with complex PPP agreements (Lee et al., 2018). Thus, this study considers PPP investment (PPPI) as a variable of interest in the regression of economic growth, and assumes that PPPs do not help promote economic growth in developing countries, especially in SA where PPPs often divert resources from market-driven to politically-driven ends. As suggested by the literature on the determinants of economic growth, additional controls are taken into consideration in this study to assess the strength of the relationship between PPPI and economic growth.

The level of human capital stock of a country, measured in terms of its educational attainment, plays a key role in economic growth. Economic literature (Romer, 1990 a,b; Benhabib & Spiegel, 1994; Aghion & Howitt, 1998; Wei & Hao, 2011) suggests that through making it possible for newly created technology to be quickly adopted and put into use, as well as by stimulating domestic technical advancements, human capital stock stimulates total factor productivity growth and, thereby, economic growth. Škare (2011) identified human capital as the second most significant driver of economic growth. Thus, the level of education, measured in this study by secondary school enrolment, is assumed to directly affect economic growth insofar as it is an essential component of the stock of human capital.

According to contemporary growth theories, the per capita GDP growth rate roughly equals the difference between the GDP growth rate and the population growth rate. However, the nexus between GDP growth and population growth is not straightforward. Many countries have experienced a negative relationship between them, but there are also those where population and per capita GDP have grown relatively rapidly together. Further, slower population increase in high-income countries is likely to cause social and economic issues, whereas fast population growth in low-income countries may inhibit their development (Peterson, 2017). Hence, this study assumes that economic growth and population growth are inversely related.

This research uses the trade to GDP ratio – the trade intensity indicator – to capture each economy's degree of openness, which is anticipated to exert a significant positive effect on GDP growth.

Regarding the relationship between inequality and growth, there is a lot of scholarly debate in the extant literature. Studies have observed income disparity to have both growth-promoting and growth-dampening effects (Petersen & Schoof, 2015). However, most conclude that higher inequality retards economic growth in the initial phases of economic development, whereas it stimulates economic growth in a nearby steady-state (Shin, 2012). Hence, this study assumes inequality, proxied by the Gini coefficient, to negatively affect economic growth.

Although public investment seemingly crowds private investment out in the short term, it has a crowding-in effect in the longer term, and thus affects economic growth positively (Santiago et al., 2019). This study incorporates private credit as a predictor in the growth regression, for which recent endogenous growth theories, following Lucas (1988) and Romer (1990), provide a background. Although there is evidence that a credit boom contributes to steeper recession, a steady expansion of private credit, especially during normal times, promotes economic growth (Randveer, Uuskula, & Kulu, 2012).

It is argued that while low inflation contributes to high rates of economic growth by promoting an investment-friendly environment (stability, confidence, and security), high and volatile inflation tends to lower economic growth. Good institutional attributes, such as low level of corruption, government effectiveness, and rule of law, are expected to have a favourable effect on economic growth. On the other hand, fiscal deficit, population growth, and government consumption are assumed to adversely affect economic growth.

For the regression of 'infrastructure access and quality', the study considers a new set of variables, some of which are common to both regressions. PPPI is again considered the variable of interest in the 'infrastructure access and quality' regression. Since the range of infrastructure services (e.g., electricity, fixed-line telephone subscriptions, mobile subscriptions, basic sanitation service) are of different types and attributes, it is reasonable to expect PPPI to have varying impacts on the access to and quality of different infrastructure services. A similar argument applies to other variables, such as real GDP per capita, government consumption (% of GDP), urban population (% of the total population), private credit (% of GDP), trade (% of GDP), inflation, government debt (% of GDP), population density, and rule of law.

3.3 Econometric Framework

This study investigates if PPPs are fit for the purposes set forth by their advocates. To this end, the study carries out regression analyses using standard panel data techniques. Depending on the availability of data and the scope of the study, two regressions were carried out: (1) regression of 'real GDP per capita', and (2) regression of 'access to infrastructure services'. In both cases PPPI is considered a variable of interest, and a variety of other controls are used, such as school enrolment, trade-GDP ratio, inflation, the stock of public capital, and private credit.

The presence of endogeneity is suspected between outcome variables and a subset of explanatory variables, such as PPPI, which might have its origin in simultaneity issue. In that case, $E(x_j, u_i) \neq 0$ for some $j = 1, 2, \dots, k$. This reverse causality may lead to bias in the estimates that can be addressed by applying simultaneous equation techniques. Alternatively, since the past values of endogenous regressors cannot be influenced by the present value of the dependent variable, lagged values can be used for each endogenous regressor.

For the purpose of choosing the appropriate model, the Hausman test was applied to both regressions to compare between the random effects (RE) model and the fixed effects (FE) model. The study found evidence in favour of RE model. However, based on findings by Judge et al. (1982), there may not be much of a difference between FE and RE estimates if the number of time series (T) is more than the number of cross-sectional units (N). The FE model may therefore be preferred based on the computational convenience score. Moreover, the FE model is regarded as the appropriate tool for assessing the overall influence of the predictors on the outcome variable when we need to account for unobservable time-invariant characteristics within cross-sectional units that may have an impact on the predictor variables (Gujarati, 2009; pp, 650).

This inconsistency between the Hausman test and the theoretical justification motivated the researcher to look for alternative techniques. To capture the dynamic nature of panel data (i.e., the within-group error terms are serially correlated), empirical growth models generally use System GMM estimators. This study, therefore, considers this latter approach as an appropriate econometric technique to investigate the catalytic impact of PPPs on economic growth.

For the growth regression, the study follows a cross-country regression approach that relates economic outcomes to infrastructure indicators while controlling for other important growth drivers. Hence, the model is specified as follows:

$$g_{it} = \alpha y_{it-1} + \sum_{j=1}^n x_{ijt} \beta_j + u_{it} (i = 1, \dots, 5; t = 1, \dots, 25) \quad (1)$$

where g_{it} stands for the rate of per capita GDP growth of country i in year t , y_{it-1} captures conditional convergence, x_{ijt} stands for the vector of exogenous regressors (the key regressor 'PPPI as a percentage of GDP' is included in this vector), and u_{it} is the error term.

To validate propositions on the catalytic impact of PPPs, and based on the available data, this study identifies five channels through which the overall economy benefits from PPPs. To this end, this study adopted the specification used by Cerra et al. (2016), which seeks to identify the factors that account for variations in the in the levels and quality of infrastructure across Latin American and the Caribbean nations. The model specification is as follows:

$$Infr_{it} = \sum_{j=1}^n x_{ijt} \beta_j + u_{it} (i = 1, \dots, 5; t = 1, \dots, 25) \quad (2)$$

where $Infr_{it}$ measures the access to infrastructure and its quality, which includes: (i) access to electricity (as percentage of the total population), (ii) telephone subscriptions (per 100 people), (iii) mobile phone subscriptions (per 100 people), (iv) basic sanitary services (as percentage of the population), and (v) overall score of infrastructure quality. The vector of regressors is given by x_{ijt} , and u_{it} is the disturbance term. The variable of interest here is again PPPI (% of GDP), as it potentially affects both access to and the quality of infrastructure services. Other controls include: real GDP per capita, inflation, government consumption expenditure (% of GDP), trade (% of GDP), private credit (% of GDP), government debt (% of GDP), urban population (% of the total population), population density, and rule of law.

4. Empirical Findings and Discussion

4.1 Public-Private Partnership Investments and GDP growth

Table 1 presents the regression results measuring the impact of PPPI as a percentage of GDP on economic growth in South Asian countries. Across all variations of the baseline model (Specification 1), the coefficient of this regressor consistently appeared to be negative and statistically significant, supporting the hypothesis that PPPs are not stimulating economic development, perhaps because they are diverting resources from market-driven to politically motivated ends. These findings echo the observation made earlier that while theoretical justifications for the potential economic benefits of PPPs exist, empirical evidence in favour of them is thin (Lee et al., 2018).

Table 1: Public Private Partnership Investment and Economic Growth in South Asia

	(1)	(2)	(3)	(4)	(5)
PPPI (% of GDP)	-1.85e+08** (8.94e+07)	-1.87e+08* (9.78e+07)	-1.89e+08* (9.94e+07)	-1.78e+08* (9.75e+07)	-1.93e+08** (9.77e+07)
Conditional convergence (y_{t-1})	0.123 (0.094)	0.124 (0.095)	0.126 (0.097)	0.103 (0.096)	0.116 (0.095)
Secondary school enrolment	0.044* (0.025)	0.046* (0.027)	0.047* (0.027)	0.047* (0.027)	0.039 (0.027)
Population growth	-0.514 (0.471)	-0.531 (0.475)	-0.537 (0.480)	-0.902* (0.540)	-0.779 (0.509)
Gini coefficient	0.041 (0.049)	-0.041 (0.050)	-0.038 (0.053)	-0.052 (0.050)	-0.079 (0.057)
Public capital stock	-0.0004 (0.0005)	-0.0005 (0.0005)	-0.0005 (0.0005)	-0.0008 (0.0006)	-0.0003 (0.0005)
Private credit (% of GDP)	-0.032 (0.022)	-0.032 (0.023)	-0.033 (0.023)	-0.028 (0.023)	-0.021 (0.024)
Trade (% of GDP)	0.055** (0.025)	0.062** (0.027)	0.063* (0.028)	0.067** (0.027)	0.037 (0.033)
Inflation	-0.007 (0.034)	-0.009 (0.034)	-0.009 (0.034)	-0.002 (0.034)	-0.006 (0.034)
Government debt (% of GDP)	-0.054** (0.026)	-0.054** (0.026)	-0.055** (0.026)	-0.056** (0.026)	-0.052** (0.026)
Fiscal balance (% of GDP)	-	4.151487 (10.07266)	4.260 (10.155)	-0.665 (10.570)	4.255 (10.056)
PPP×Fiscal condition dummy	-	-1.44e-18 (6.28e-18)	-1.57e-18 (6.39e-18)	-3.23e-18 (6.37e-18)	1.46e-18 (6.64e-18)
Corruption control	-	-	-0.169 (1.215)	-	-
Government effectiveness	-	-	-	2.196 (1.537)	-
Rule of law	-	-	-	-	1.9789 (1.486)
Constant	5.679** (2.747)	5.580** (2.815)	5.373* (3.195)	7.220** (3.026)	9.013** (3.814)
Wald chi2(15)	38.48***	40.76***	40.35***	43.24***	42.67***

Note: Real per capita GDP growth serves as the dependent variable. Standard errors are in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The baseline model is specified such that it is possible to check for nonlinearity in the PPPI-economic growth relationship. To examine if PPP increases during periods of severe fiscal constraint, the regression analysis includes a variable showing interaction between PPPI and a dummy variable that takes the value of 1 if, at year t , country i records a fiscal deficit of more than 10% of its GDP, indicating severe fiscal constraint, and 0 for otherwise. The coefficient of interaction term appears with a negative sign in all specifications, except specification 5. A negative coefficient implies that the fiscal deficit diminished the growth contribution of PPPI. However, the interaction effect of PPPI and fiscal deficit is not found to be significant.

Regarding population growth, although coefficients are found to be negative in all specifications, as hypothesized, the variable is found to be significant (at a 10%) only in specification 4. In specifications 3–5, the study uses three institutional variables – control of corruption, government effectiveness, and rule of law – alternately with the baseline regression to account for heterogeneity in institutional quality and features. However, their inclusion has no impact on the importance of PPPI or the direction of its influence.

Economic growth and education have long been viewed as being closely related. The empirical evidence presented in Table 1 also reveals that secondary school enrolment positively affects economic growth with only a 10% level of significance. The poor significance of this variable is not surprising given that enrolment statistics do not always accurately reflect the quality of education, which is crucial for promoting economic growth. A better indicator of economic growth would perhaps be enrolment numbers in combination with the number of schools, or alternatively, teacher-student ratios. Moreover, for the positive effects of education on economic growth to be apparent, employment opportunities for educated people is a must (Luqman, 2012). Results might have been improved if the year of schooling or literacy rates had been used as a substitute for the education variable. However, data on literacy rates and other education-related metrics are frequently unavailable in SA, and the time periods for which data are accessible differ across countries; hence, the analysis had to rely on school enrolment (secondary) figures as a stand-in for educational attainment.

Trade (% of GDP) is found to have a significant positive impact on growth in GDP per capita, as economic theories suggest, which highlights the importance of increased involvement in international trade. Results also show that government debt (% of GDP) has a negative impact (at 5% level of significance) on economic growth in all specifications; strongly suggesting that deficit monetisation in this region is not spent appropriately.

Finally, it can be concluded that the PPPI (% of GDP) outcome is found to be robust to change in model specifications, which suggests that PPPs are not a good fit in promoting economic growth.

4.2 Infrastructure Access and Quality

Table 2 presents the regression results on access to infrastructures and overall infrastructure quality in SA countries. As indicated earlier, these regressions are run against a different set of regressors, following system GMM. There are four versions of the

regression specification of the infrastructure access variable depending on the type of infrastructure – electricity, fixed-line telephone subscriptions, mobile phone subscriptions, and basic sanitation services – and one regression for infrastructure quality.

Table 2: Public Private Partnership Investment, and Infrastructure Access and Quality in South Asia

	Electricity	Fixed-line Telephone Subscriptions	Mobile Subscriptions	Basic Sanitation Services	Infrastructure Quality (Overall)
PPPI (% of GDP)	2238952 (1.88e+08)	-4.03e+07 (4.23e+07)	5.78e+08*** (2.20e+08)	1.23e+07 (1.19e+07)	1003019 (6105324)
Real GDP per capita	0.0003 (0.0005)	-0.00006 (0.0001)	0.002*** (0.0008)	-0.00002 (0.00004)	0.00001 (0.00001)
Inflation	-0.030 (0.070)	0.025 (0.016)	0.058 (0.081)	-0.014*** (0.005)	-0.005** (0.002)
Government consumption expenditure (% of GDP)	0.248 (0.228)	0.242*** (0.051)	1.355*** (0.260)	0.006 (0.016)	0.013* (0.008)
Trade (% of GDP)	-0.199** (0.066)	-0.008 (0.014)	0.029 (0.065)	-0.001 (0.004)	-0.003 (0.002)
Private credit (% of GDP)	0.297*** (0.083)	0.003 (0.013)	0.083 (0.067)	0.002 (0.004)	0.005** (0.002)
Urban population (% of total population)	1.713*** (0.625)	-0.194 (0.134)	-1.294* (0.704)	0.008 (0.046)	0.045** (0.019)
Population density	-0.020 (0.025)	0.008 (0.006)	0.086*** (0.031)	-0.0002 (0.002)	-0.0023*** (0.0009)
Government debt (% of GDP)	0.002 (0.049)	-0.008 (0.012)	-0.319*** (.061)	-0.006* (0.003)	-0.002 (0.002)
Rule of law	-3.567 (2.317)	-0.349 (0.540)	-8.794*** (2.876)	-0.045 (0.179)	-0.205** (0.084)
Constant	-11.981* (6.955)	0.193 (1.661)	-6.023 (8.247)	2.410*** (0.567)	1.564*** (0.294)
Wald chi2(13)	2810.54	1243.88	13461.21	488337.37	291.51
Prob> chi2	0.0000	0.0000	0.0000	0.0000	0.0000

Note: Standard errors are in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The regression results indicate that PPPI in SA plays a significant positive role in increasing access to infrastructure only in the case of mobile phone services, and not for electricity, fixed-line telephone, nor basic sanitation services. As well, it does not

significantly affect the overall quality of infrastructure services. The finding that PPPI is highly significant in positively affecting access to mobile phone services is consistent with a general trend of rising telephone connections and improvements in information and communication technology (ICT) (John et al., 2015). Per capita real GDP also positively affects access to mobile subscriptions, but only at a 1% level of significance, suggesting that increased GDP per capita in these countries is being used primarily for increasing cellular connectivity, and not for other priority uses such as electricity, sanitation services, and overall infrastructure quality.

Increased government consumption expenditure is found to positively contribute to access to telecommunications (fixed-line and mobile), but not to the other infrastructure types. Government consumption expenditure can be defined as government spending on goods and services that are dedicated to satisfying citizen's individual and/or collective needs and these results indicate that this expenditure is not being directed towards more pressing needs, such as electricity and sanitation. However, it positively affects the quality of infrastructure services, although with limited significance (at 10%).

Results also show that an increase in the inflation rate negatively affects both access to basic sanitation services and the overall quality of infrastructure. This implies that with increased price levels, people cannot afford access to quality infrastructure and basic sanitation services. Further, openness, measured in terms of trade as percent of GDP, negatively affects access to electricity. Nampoothiri and Manoharan (2013) identified a number of trade-related factors that play a significant role in promoting or constraining access to sustainable energy. With this in mind, the findings here imply that the factors that constrain access to electricity dominate the factors that facilitate it.

An increase in both private credits (% of GDP) – broadly defined as non-bank lending – and urban population (% of the total population) positively and significantly affect access to electricity and overall infrastructure quality. As expected, while high population density increases mobile phone subscriptions, it adversely affects infrastructure quality. Results also show that as the government debt to GDP ratio rises, access to telecommunication and basic sanitation services decreases. Surprisingly, rule of law appears with a negative coefficient, although not equally significant in different model specifications. The impact in practice, however, depends on how rule of law is defined and practiced in a society. It is a widely accepted norm that the rule of law requires both rulers and ruled to be accountable to the law; however, if institutions of public power become mere instruments of the ruling class, adverse consequences are likely. Hence, there is reason to be sceptical that society will necessarily reap all the economic growth benefits rule of law could promote.

5. Conclusion

Improving the quantity, quality, and accessibility of infrastructure in developing countries remains vital for enabling faster economic growth and development. Yet, with the exception of some emerging nations, the infrastructure in developing countries is incommensurate with their needs. Thus, it is critical to raise sufficient infrastructure financing to support these nations' inclusive growth and sustainable development.

This paper investigates the possibility of macroeconomic gains from PPPs, either as infrastructure projects or as a public financing tool. Through PPPs, the infrastructure–growth link is argued to become stronger, particularly when partnership arrangements place an emphasis on high-quality of infrastructure service, better maintenance, and completing projects on schedule and within budget. However, this paper does not find evidence of this in SA, but rather finds PPPs to adversely affect economic growth. The sectoral performance of PPPs, however, has been mixed: only in telecommunications (mobile subscription) does it appear to be unambiguously positive. Thus, it can be concluded that PPPs in the South Asian region are not fit for the purposes set for them. From a public policy standpoint, the main goal of a PPP should be to improve a given service to the public while enabling public funds to be channelled into other crucial sectors and easing long-term pressure on public budgets (Jomo et al., 2016). However, in many cases, including in this study, anticipated gains have not been realized, and the performance and profitability of PPPs varies substantially across activities and sectors (ibid). It is crucial; therefore, that governments and policymakers re-evaluate the worth of projects under PPP, be more cautious when signing PPP contracts, and perform the necessary cost-benefit analysis. Before pursuing the PPP route, policymakers should consider other alternatives. If a PPP project is required, it is essential that the country has the institutional capability to establish an enabling environment, that the PPP is directed toward desired societal goals, and that the project is critically evaluated, particularly with regard to the possibility that alternative funding sources may offer a superior alternative to both the PPP and to conventional ways of providing the service or infrastructure.

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