

# The State of Public-Private Partnerships in Times of Global Economic Disruption

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*Growth in large private business enterprises in the 20<sup>th</sup> century established an environment that enabled a competitive relationship through Public-Private Partnerships (PPP) with the public sector, which historically suffered from inefficiencies and an over-reliance on projects and services, especially in emerging economies. PPPs can positively impact public safety, quality of life, new economic opportunities, poverty reduction, and benefit from long-term private capital and outside expertise. However, PPP investment is sensitive to critical factors such as: the macroeconomic environment, institutional and regulatory conditions, market size, rule of law, and enforceable contracts, among others. Thus, managing PPP projects is a very complex task, due to its multidisciplinary characteristics and the involvement of multiple stakeholders. In times of global economic disruption, this task becomes even more challenging. This study presents threats and opportunities for the execution of PPPs in times of global crises and their relationship with globalization trends.*

*Keywords: emerging economies, global crisis, macroeconomic environment, public private partnerships (PPPs), globalization, critical success factors, economic disruption*

## **INTRODUCTION**

The public and private sectors working together to benefit each party are not new to economic and political systems. Private investment in public projects can be identified as early as the 18th century across Europe with the creation of drinking water supplies and in the 19th century across China, Japan, and the United States through infrastructure projects that at times blurred the lines between public and private participants (Tang, Shen, & Cheng, 2010; Kumaraswamy & Morris, 2002; Beauregard, 1998). Growth in large private business enterprises in the 20th century established an environment that enabled a competitive relationship through Public-Private Partnerships (PPP) with the public sector, which historically suffered from inefficiencies and an over-reliance on projects and services, especially in emerging economies (Bhavani, 2019; Vinogradov, Shadrina & Kokareva, 2014; World Bank, 2016). PPPs emerged as a useful

tool for governance and management and an effective approach to producing a functioning infrastructure for the project. PPPs also create holistic positive impacts on public safety, quality of life, new economic opportunities, and poverty reduction, facilitate comprehensive trade, and stimulate private investment (Bhavani, 2019; Gurara, Klyuev, Mwase, Presbitero, & Bannister, 2017). Private partners also benefit from the scale of government resources, stable public policies, and increased success rates, while public partners benefit from long-term private capital and outside expertise. The trend in infrastructure investments for PPPs grew from US\$ 12 billion in 1990 to US\$ 97 billion in 2019, mostly influenced by five big economies—China, India, Brazil, Mexico, and Turkey.

The increased utilization of PPP introduced challenges for public sector partners facing shifting project objectives and reduced project oversight (Casady, Eriksson, Levitt, & Scott, 2019), including reduced opportunities for innovation, reduced flexibility, insufficient transparency, perceived additional risks, and long term financial cost benefits (Abramson, Soskis, & Toepler, 2014; Greve, Hodge, & Boardman, 2017; Grev, Hodge, & Biygautane, 2018; Yuan, Wang, Skibniewski & Li, 2012). The growth of PPP execution led to increased interest in PPP research over the last two decades, emerging as a meta-discipline that leverages contributions across multiple domains of research exploring collective risks, partner relationships, investment environments, governance issues, project outcomes, and the role of financing (Narbaev, De Marco, & Orazalin, 2019; Tang, Shen, & Cheng, 2010; Hodge & Greve, 2018).

The PPP is not unanimously defined. Country-specific variables, including the contract arrangement, asset ownership, type and share of investment, allocation of risk, and length of the project, have influenced how PPP is defined. In Canada, Australia, and some European countries, the execution of PPP is defined as “long-term, contractual cooperation between the public and private sectors for the economic execution of public tasks under which the necessary resources are bundled in a joint organizational relationship and any project risks are allocated appropriately to reflect the risk management expertise of the project partners” (Alfen, 2003). In the UK, PPP in the 1990s was defined as a Private Finance Initiative (PFI), and it is characterized by the short-term transfer of integrated private sector services (planning, construction, finance) to the private sector to generate efficiency gains and hence to bridge public sector liquidity bottlenecks of urgent projects (Weber, Staub-Bisang, & Alfen, 2016). The Organization for Economic Cooperation and Development (OECD) defines PPPs as “long-term contractual arrangements between the government and a private partner whereby the latter delivers and funds public services using a capital asset, sharing the associated risks.”

In this research, we define PPP as “a method of procurement used by the public sector, for providing a public asset or delivering a service that can integrate the planning, construction, finance, investment, maintenance, and operation phases, performed based on long-term cooperation between the public and private sectors that require the conclusion of comprehensive contractual provisions” (Weber, Staub-Bisang, & Alfen, 2016, p.89).

Research has examined the institutional elements of PPPs and determined the critical success factors (CSF) for a PPP to create mutually beneficial results for all parties across the lifetime of the project. CSFs must account for the project’s core purpose, account for regional influences on PPP measurement, and have a unified vision for both parties focused on meeting realistic goals. This vision demands open communication, transparency, and a willingness to collaborate early in the planning process to define attainable public and business objectives through ongoing meetings with a system to resolve conflicts through collaboration in pursuit of the shared vision (Li, Akintoye, Edwards, & Hardcastle, 2005; Kahwajian, Baba, Amudi, & Wanos, 2014; Jacobson & Choi, 2008). In addition, PPP investment is sensitive to the macroeconomic environment, institutional and regulatory conditions, corruption, geographic stability, and market size. The rule of law, accountability and transparency in government, administrative capacity, clear property rights, contract design, financing issues, and enforceable contracts are other critical factors influencing PPP investments (EIU 2014; World Bank, 2016; Leigland, 2018; Hilmarrsson, 2012; Bhavani, 2019). Thus, managing PPP projects is a very complex task, due to its inherent multidisciplinary characteristics and the involvement of multiple stakeholders across society, government institutions, auditors, private sector stakeholders, and financial institutions. In times of global crisis, in

which economic disruption is spread on a global scale, the task of managing a PPP project becomes even more challenging.

The 1997-98 Asian financial crisis (AFC) negatively affected many nations worldwide and directly impacted emerging-market PPP projects. Before the AFC, infrastructure investments in PPP grew from 0.1% to over 1.1% between 1991 and 1997. The AFC caused an 80% decline in PPPs from 1997 to 1998, with Latin America and East Asia regions most affected. Similarly, the 2007-08 global financial crisis (GFC) effects on PPPs were tremendous in advanced and developing economies. The impact of the GFC reduced the pipeline of new PPP projects, decreased profits of existing PPPs, postponed investments, and increased contract claims, renegotiations, and litigations.

Both crises revealed immediate needs for reforms in the infrastructure sector and financial markets. These reforms included more discipline in financing infrastructure investments, improved corporate governance, increased institutional accountability, greater support of Multilateral Development Banks (MDB), improved management of contingent liabilities, more transparent competitive bidding policies, and deeper analysis on selecting activities transferred to private investors. The need for more robust policies in risk management, the creation of independent regulatory bodies, clear priorities for sustained growth, and more robust foreign exchange planning and management also emerged as focused areas for reform (Baietti, 2001; Valenti, & Schneider, 2014; Izaguirre, et al., 2020; Burger, Tyson, Karpowicz & Coelho, 2009).

Similarly, the impact of the COVID-19 global crisis on the PPP market is still unpredictable (World Bank, 2020). However, the negative impact continues to be measured across the global supply chain, global production networks, demand-supply patterns, availability of labor and materials, capital distress in balance sheets and cash flows, and public debt (Grover, Rahemtulla, & Gin, 2020). Some view the rise of globalization as the main cause of the drastic consequences of the COVID-19 pandemic due to the increased interconnection among nations. Still, before the emergence of COVID-19, many countries were already living an era of increased nationalism, protectionism, populism, trade wars, and income inequality (Petricevic and Teece, 2019; Buckley, 2020; Kim, Li & Lee, 2020; Antràs, 2020; Javorcik, 2020). As COVID-19 spread globally these conditions intensified the volatility and uncertainty of globalization trends, as it reduced movements of goods, services, capital, and labor in an unprecedented manner, shrinking the global economy.

While global crises can dramatically impact the execution and investment in PPP projects, these crises can create opportunities for governments to engage cooperatively with the private sector to create new resilient possibilities for innovation, directly impact unemployment rates, reduce government debt, control inflation rates, and directly impact the economy. In sum, PPPs can promote a triple-win scenario for their main stakeholders: government, private sector, and community. PPPs were extensively implemented and continually improved over the last three decades. However, the analysis of the most vulnerable critical success factors for PPP execution during global crises is scarce. Moreover, the relationship between globalization, measured based on economic, political, and social dimensions, and the execution of and investment in PPPs has not yet been studied. To mitigate these gaps, we identify the critical success factors and risk factors that influence the execution of PPPs and which are the most influencing ones during a global crisis. In addition, this study investigates the influence of globalization in the relationship between those influencing factors and the execution of PPPs in emerging markets. Thus, the present research contributes to a better understanding of the motivations and vulnerabilities of these partnerships during global crises for both public and private sectors and, in the same vein, of the patterns of PPPs in relationship to globalization trends.

Our study aims to investigate threats and opportunities for the execution of PPPs in times of global crisis and their relationship with globalization trends. The study contributes to the literature in the following ways: (i) understand how the macroeconomic environment influences the execution of PPPs based on GDP growth, public debt, inflation, and unemployment rates; (ii) support government's decisions on fostering private investment in infrastructure to leverage economic recovery after a global crisis in emerging economies; and (iii) assess how countries' openness to trade and to foreign direct investment can influence the execution of PPPs, based on the Globalization Index.

This paper is structured as follows. Section two provides a literature review that examines the main aspects associated with the execution of PPP, and their patterns during times of global disruption. It further outlines the research gap in the literature. Section three presents the hypotheses resulting from the literature review and the data description and the proposed methodology. The penultimate section provides the results and discussions. Finally, the fifth section offers the main conclusions and future research opportunities.

## **LITERATURE REVIEW**

Public-Private partnerships (PPPs) have received the attention of both practitioners and academics. PPPs combine private financing for public sector projects by merging management responsibilities and shared objectives. Private investment and project development throughout the 1980s and 1990s grew in popularity, while simultaneously public sector reforms embraced the growing popularity of leveraging private entities to support projects to benefit all parties. The merger of public and private stakeholders raised concerns that the parties responsible for the initial financing and oversight of public-private projects would benefit from increased influence when compared to those who ultimately are financially responsible for the life of the project or impacted by the projects' success or failure (Sagalyn, 2007; Tang, Shen & Cheng, 2010).

However, the rise of public debt across multiple nations in the 1970s and 1980s increased pressure on governments to utilize policies that encouraged private investments in infrastructure, especially in emerging economies. According to Gurara et al. (2017), public debt was aggravated by the fiscal deficit, budget constraints, and the gap between supply due to urbanization, population growth, and changes in the social structure (Rebeiz, 2012). Academic research leveraged innovative ways to measure the significance and impact of PPPs in support of future planning and determinates of success. This literature review examines the body of current academic research to establish how PPPs are utilized, the critical success factors and risk factors for the execution of PPPs, the adoption of PPPs across emerging economies, the utilization of PPPs during an economic crisis, and, finally, how globalization can be associated to the execution of PPP.

### **Overview of PPP Utilization**

By the end of the 20th century, PPP emerged as a global tactical approach to deliver projects and services through the redefinition of public and private sector roles, resulting in varying definitions of PPP across geographic regions, how success was measured, and which models would be used to for implementation (Grimsey & Lewis, 2005; Piper, 2009; Winch, 2000; Luo, Gale, & Xiaoxin, 2001). The benefits of PPP for participating parties are broadly understood with no singular broadly accepted definition of PPP (Hilmarsson, 2012; Vinogradov, Shadrina & Kokareva, 2014). Country-specific variables influence variances in defining PPP and they can take various forms, differing from the traditional public procurement through the type of Private Participation in Infrastructure (PPI), ownership, investment, who pays for it, allocation of risk, the nature of the contract between parties, and length of the project (Bayliss & Van Waeyenberge, 2018; Rebeiz, 2012) (Table 1).

**TABLE 1**  
**MAJOR TYPES OF PRIVATE INVESTMENT IN INFRASTRUCTURE (ADAPTED BY**  
**AUTHORS, BASED ON WORLD BANK'S PPI DATABASE)**

Subcategories of PPPs	Main Category	Ownership	Investment	Allocation of risk	Who Pays	Cont. Len. (years)
Management Contract	Management & Lease	Public	Public	Public	Public (Fixed + Variable fee)	3-5
Leasing Contract	Management & Lease	Public	Public	Semi-Private	User	8-15
Rehabilitate, Operate, Transfer	Brownfield	Public	Private	Semi-Private	User	20-30
Rehabilitate, Lease/Rent, Transfer	Brownfield	Public	Private	More-Private	User	20-30
Merchant	Greenfield	Public	Private	More-Private	User	20-30
Build, Rehabilitate, Operate, Transfer	Brownfield	Public	Private	Private	User	20-30
Build, Operate, Transfer	Greenfield	Semi-Private	Private	Private	User	20-30
Build, Lease, Transfer	Greenfield	Semi-Private	Private	Private	User	+30
Build, Lease, Own	Greenfield	Private	Private	Private	User	+30
Build, Own, Operate	Greenfield	Private	Private	Private	User	+30
Partial Privatization	Divestiture	Private	Private	Private	User	+30
Full Privatization	Divestiture	Private	Private	Private	Public (license granted)	Indefinite

The effective allocation of risk has a direct financial impact on the project, as it will result in lower overall project costs and enhanced value (Krzes-Dobieszewska, 2014). The private partner remuneration can be either directly from end-user payments or periodic fees from the public entity. In the latter, the payment, established in the contract, is generally not dependent on the actual demand of end-users, but the compliance of the contract.

According to the World Bank, PPP contracts are classified into four different categories with their subcategories (Table 1): management and lease, brownfield, greenfield, and divestitures. In management and lease contracts, the state holds the ownership, and private investors are only responsible for operating and maintenance, while in divestiture contracts, the private investor bears almost all risks of the operation, investment, and ownership, since it buys an equity stake in a state-owned enterprise. In brownfield and greenfield contracts the assets' ownership belongs to the public sector while considerable rights are transferred to the private sectors. Greenfields are related to new assets, while brownfields are related to existing assets. In sum, the higher is the commitment and ownership, the higher is the risk for the private entity.

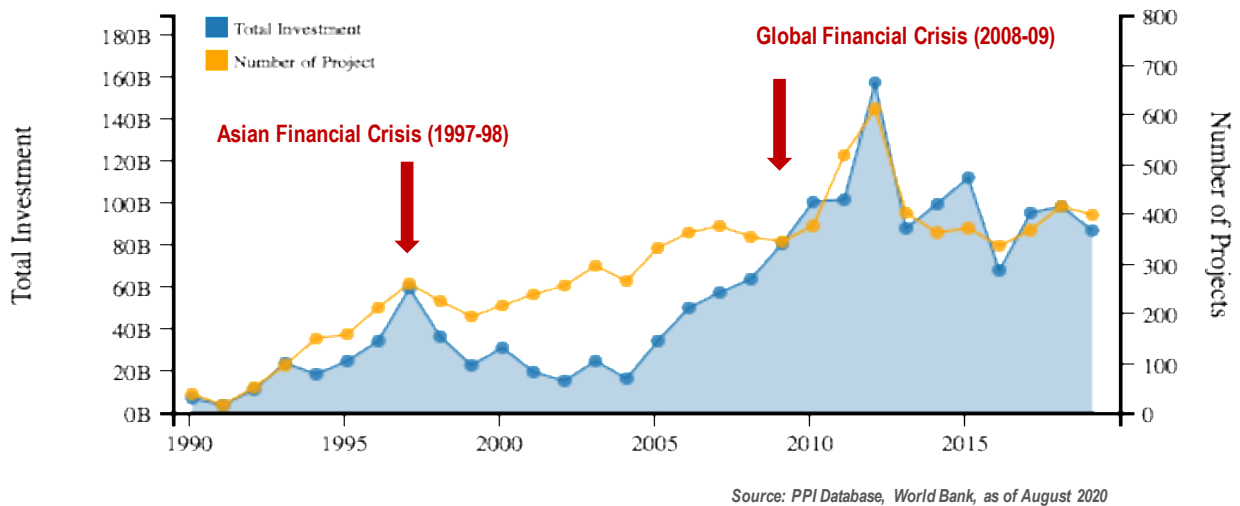
### PPP in Emerging Markets and Developing Economies (EMDEs)

In the past decade, EMDEs have grown faster than advanced economies, reaching above 60% of global GDP (IMF, 2020), due to the globalization of trade and financial flow into developing economies. Since the 2008 financial crisis, the EMDEs have contributed to more than 80% of global growth, job-saving, and global poverty reduction (Gurara et al, 2017; Bayliss & Van Waeyenberge, 2018). According to the World Bank PPI Database, investments in PPPs in EMDEs grew steadily from \$6.3 billion in 1991 to \$91 billion in 1997. The AFC produced a period of contraction from 1997-1998 until investments in PPPs declined to \$21.9 billion in 2002. A second growth phase of PPP resulted from improvements in structural reforms, policies, and the global economy during the mid-2000s, resulting in PPP investments reaching \$160 billion in 2012. This second growth phase was not impacted by the GFC of 2008, as it was by the AFC, due to countries increasing the public share in financing infrastructure projects to re-stimulate the global economy. Total investments in PPP declined 40% to \$96 billion in 2013, continued by some fluctuations in investment with increases in 2015, declines in 2017, offset by 2018 investment totals of \$100 billion (Figure 1).

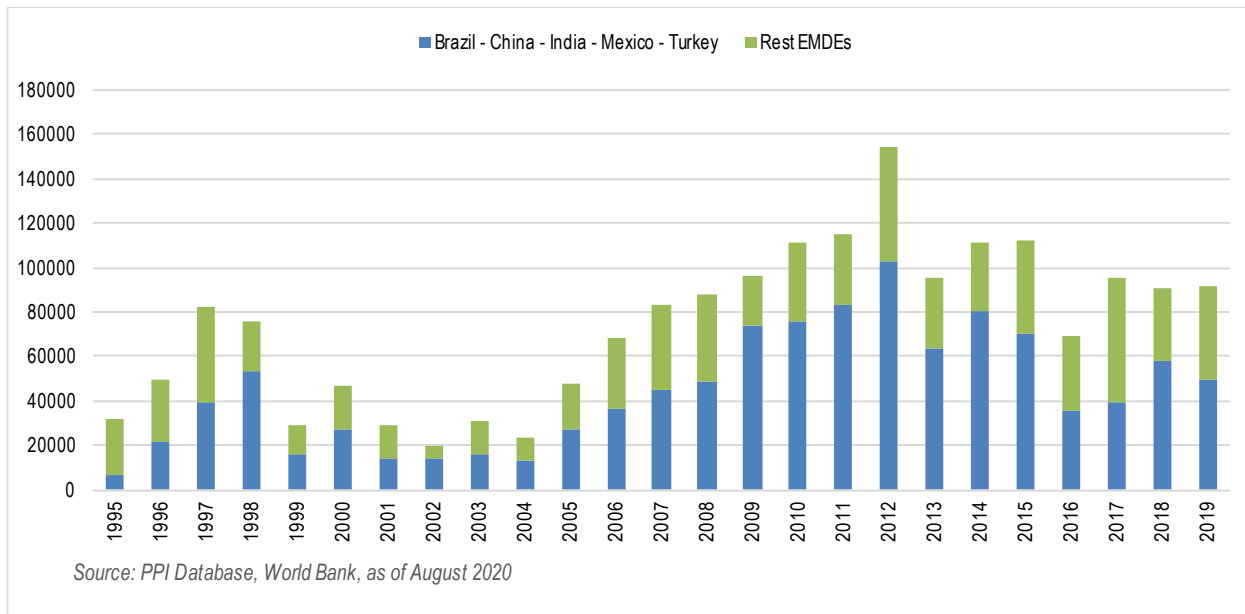
EMDEs have strong incentives for future infrastructure investment (Bayliss & Van Waeyenberge, 2018). From 1995 to 2019, Brazil, China, India, Mexico, and Turkey contributed 60% or \$1.1 trillion of the \$1.85 trillion in PPP investment commitments, increasing from 23% in 1995 to 77% in 2009 (Figure 2), while other EMDEs remained strong from 2012 through 2017.

Investing in PPPs in emerging markets has its challenges. Lack of planning (World Bank, 2016), volatility in consumer purchasing power (Amponsah & Bhavari, 2019), and the reluctance of the public sector to absorb project-related risks (Hilmansson, 2012; EIU, 2014; Leigland, 2018), impact in an increase in contract renegotiations and cancellations. Similarly, private sector participants prefer to invest in projects with short payback periods in high sovereign risk countries instead of long-term projects (World Bank, 2016; Hilmansson, 2012), allowing for reduced risk. Additionally, private partners benefit from the financial structure associated with PPPs, as raising capital is usually more expensive for the private sector in EMDEs than for the public sector.

**FIGURE 1**  
**INVESTMENTS IN PPP INFRASTRUCTURE PROJECTS IN EMDES, 1991-2019**



**FIGURE 2**  
**PPI IN BRAZIL-CHINA-INDIA-MEXICO-TURKEY VS REST OF EMDES, 1995-2019**  
**(IN US\$ MILLIONS)**



Thus, many EMDEs have made significant efforts in the past decade to improve and enable their investment environment for PPPs such as in their regulatory, legal and institutional systems, by creating or updating their PPP and concession laws and creating specific PPP body units. Similarly, financial institutions such as the Multilateral Development Banks (MDBs), which provide financial support for developing economies in loans, guarantees, equity, and risk management instruments, have produced enormous improvements since their conception. Such instruments attract new financing resources, reduce capital costs, and provide coverage for risks that the market is unable or unwilling to bear (Hilmarrsson, 2012).

### Critical Success Factors & Risk Factors in PPP

Critical success factors (CSF) must be coupled with a timeline for measurement to validate short-term successes and long-term objectives over the project's lifetime, as anticipated and unexpected changes in the project can impact measurement over time (Węgrzyn, 2016). Public and private stakeholders share key project objectives, costs, timelines, and services related to the PPP. However, there are notable differences regarding shared CSFs regarding budget constraints, the share of risk transference, and any guarantees contractually outlined to each PPP participant (Zou, Kumaraswamy, Chung & Wong, 2014; Sehgal & Dubey, 2019). Shared common CSFs are also accompanied by nuanced differences in defining success that can impact how each partner measures the success of the PPP. These include the commitment and responsibility of the public and private sectors, cost-benefit assessment of the project, a complimentary legal framework, competitive procurement, and political support (Li, Akintoye, Edwards, & Hardcastle, 2005; Sehgal & Dubey, 2019; Osei-Kye & Chan, 2017; Yuan et al., 2012).

PPP investment is sensitive to the macroeconomic environment, institutional and regulatory conditions, corruption, geographic stability, and market size. Rule of law, accountability and transparency in government, administrative capacity, clear property rights, contract design, financing issues, and enforceable contracts are other critical factors influencing PPP investments (EIU 2014; World Bank, 2016; Leigland, 2018; Hilmarrsson, 2012; Amponsah et al., 2019; Chan & Osei-Kyei, 2015). After analyzing the conclusions of several previous studies, new classifications, and a new aggregation of the most common

CSF of PPP are proposed in Table 2, divided into two categories, according to their extrinsic or intrinsic nature.

**TABLE 2**  
**CLASSIFICATION OF CRITICAL SUCCESS FACTORS**

<i>Factor typology</i>	<i>Success factors</i>	Conditions for Success
Exogenous Factors	Macroeconomic Environment	<ul style="list-style-type: none"> <li>- Favorable economic system</li> <li>- Low vulnerability</li> </ul>
	Legal Environment	<ul style="list-style-type: none"> <li>- Institutional Quality</li> <li>- Solid legal framework</li> </ul>
	Political Environment	<ul style="list-style-type: none"> <li>- Stable political system</li> <li>- Government support</li> </ul>
Endogenous Factors	Financial Structure	<ul style="list-style-type: none"> <li>- Stable currencies of debts and equity finance</li> <li>- Fixed or low-interest rate financing</li> <li>- Abilities to deal with fluctuations in interest/exchange rates</li> <li>- Appropriate toll/tariff level(s) and suitable adjustment form</li> </ul>
	Economic Viability	<ul style="list-style-type: none"> <li>- Financial resources availability</li> <li>- Technical feasibility</li> <li>- Profitability of the project</li> <li>- Low volatility in purchase power</li> <li>- Stable demand</li> </ul>
	Trust	<ul style="list-style-type: none"> <li>- Commitment and responsibility among partners</li> <li>- Alignment on strategic objectives between public &amp; private partners</li> </ul>
	Effective Risk Management	<ul style="list-style-type: none"> <li>- Suitable risk allocation</li> <li>- Transparent and flexible contracts</li> <li>- Accountability</li> </ul>
	Procurement Process	<ul style="list-style-type: none"> <li>- Transparency</li> <li>- Competitiveness</li> </ul>
	Effective Project Management	<ul style="list-style-type: none"> <li>- Planning, construction, and completion on time/budget</li> <li>- Projects reaching financial close</li> </ul>
	Efficient Operation	<ul style="list-style-type: none"> <li>- Previous experience in PPP</li> <li>- Reliable and quality service operations</li> <li>- Effective technology transfer and innovation</li> </ul>
	Environmental, Social, Governance (ESG)	<ul style="list-style-type: none"> <li>- Low Environmental Impact</li> <li>- Public safety and health conditions</li> <li>- Strong Corporate Governance Structure</li> </ul>



**TABLE 3**  
**RISK FACTORS**

<i>Risks identified</i>	<i>Brief description of critical issues affecting PPPs</i>	<i>Source</i>
Political, legal, and regulatory risks	Lack of political support and an independent regulatory body with expertise and decision power; fragile policies for entire project life cycle; change in legislation; breach of contract; unenforceable contracts; expropriation or nationalization of assets; strong political opposition; government's intervention, lack of transparency and accountability.	Babatunde et. al Chou et. al. 2015; et. al. 2017); (2018); Hilmarsson Amponsah et al. Tang et. al (2010).
Market risk	Reduction in demand (sales); change in the price of the product/ service offered; low customer purchasing power.	Chou et. al. 2015; et. al. 2017); (2018); Amponsal (2019); Tang et. al
Macroeconomic risk	Exchange rates, interest, and inflation rates volatility; high public debt; high-risk economy; influential economic events; global crisis.	Mota et. al. 2015; al. 2015; Mostaa 2017); Leigland Hilmarsson Amponsah et al. (2
Financial risk	Information asymmetry and risk averseness; poor financial projections and access to funds; poor financial attraction of project to investors; fragile guarantees.	Chou et. al. 2015; et. al. 2017); EI Leigland (2018); A et al. (2019); Tar (2010).
Environmental, Social, Governance (ESG) Risks	Climate change, resource scarcity, environmental degradation, change in environmental regulation, natural disasters.  Human rights, labor rights, strikes, health and safety risks for employees and local communities, public resistance to the project, consumer unprotecting.  Corrupt business practices; weak public and corporate governance structures; weak rule of law; and poor government and stakeholders relationship.	Babatunde et. al Chou et. al. 2015; et. al. 2013; Mosta 2017); Leigland Hilmarsson Amponsah et al. (2
Project planning Risk	Weak planning; project approvals and permit delays; design deficiency; lack of innovation; unproven engineering techniques; scope variation; construction over cost; construction delay; Material/labor scarcity, poor quality workforce; insolvency/default of sub-contractors or suppliers, lack of experience in PPPs.	Babatunde et. al Mota et. al. 2015; al. 2015; Mostaa 2017); EIU 2014; (2018); Hilmarsson Amponsah et al. Tang et. al (2010).
Procurement Process Risk	Uncompetitive tender; poor procurement incentives; lack of coordination/communication; lack of information, knowledge,	Babatunde et. al Mota et. al. 2015; al. 2015; Mostaa

### PPP in Times of Global Crisis

Managing PPP projects is a very complex task due to its inherent multidisciplinary characteristic (Narbaev, De Marco, & Orazalin, 2019) and the involvement of multiple stakeholders, including society, government, auditors, private sector partners, and financial institutions. PPP projects are more challenging to execute in times of global crisis due to the impact on public and private sectors and financial institutions, who perceive the risk impact differently (Krzes-Dobieszewska, 2014; Burger et al, 2009). Thus, PPPs are vulnerable to the crisis's financial and real impact.

During a global crisis, existing and planned PPPs can be affected through various channels, including credit availability, cost of credit, lower growth, future cash flows, decreasing revenue, increased operational costs, unpredictable exchange rates, and continued economic changes. The additional impact can arise from changes in the market, including new preferences of potential users, competitiveness, and risk aversion of stakeholders (Krzes-Dobieszewska, 2014; Burger et al., 2009; Gabriela & Mircea, 2010). While financial institutions shift from long-term loans towards short-term loans, increase credit margins and costs associated with raising capital, due to risk aversion, private investors prioritize contracts free of risk associated with customers' willingness and ability to pay for services (Guellec & Wunsch-Vincent, 2009; Krzes-Dobieszewska, 2014). Conversely, the urgent need to act strategically and concurrently on different fronts, governments tend to limit some projects and prioritize sectors with higher needs of public service delivery, while at the same time, take economic measures to counteract downfalls and protect vulnerable populations from unemployment or income decline (Krzes-Dobieszewska, 2014). These costly actions occur simultaneously as government revenues fall, financing options shrink, and public debt increases (Burger et al., 2009).

The large number of variables influencing the PPP market in times of a global crisis requires governments to be prudent when adjusting their strategy, due to their impact on assets, liabilities, income, expenditure flows, profitability, investment decisions, solvency, and liquidity of a PPP (Guellec et al., 2009). Anti-crisis packages to stimulate the economy can include increasing the role of private capital in financing public investments and services and governments taking more risks. In turn, the private sector contributions extend beyond financing through job creation, generation of income, delivery of basic and new services, value-added through innovation, and generation of tax revenues; while being benefitted from a stable source of revenue (Krzes-Dobieszewska, 2014; Burger, et al., 2009; Gabriela et al., 2010, Reeves & Palcic, 2017; World Bank, 2018).

### **The Most Influencing Factors for the Execution of PPP in Times of Global Crisis**

The 1997-98 AFC was a macroeconomic shock experienced by many Asian economies after several years of rapid economic growth, capital inflows, government borrowing buildup of debt. With liberalization and privatization policies stimulating the infrastructure market in those countries, foreign investors perceived Asian markets were experiencing an economic miracle with guaranteed high investment returns and increased interest in speculative investment projects, becoming an important region for investors in long-term operators of infrastructure assets (Burger et al., 2009). Firms overextended themselves with increased borrowing, currencies became vulnerable to speculation, and a combination of other factors caused a depreciation in the exchange rate, and investors struggled to meet the payments, creating an "asset bubble" (Izaguirre & Rao, 2000; Baietti, 2001). Both governments and private investors boosted high external debt ratios, and currency devaluations caused debt repayments to become more expensive, resulting in firms and countries defaulting on their debt repayments. This transformed the over-confidence of foreign investors in the Asian economies into profound pessimism, causing them to reduce their stakes in the Asian market and destabilizing capital outflows. The increased price of imports and imported raw materials impacted consumers' spending, resulting in the intervention of the IMF to try and stabilize the crisis with the insistence on fiscal restraint through lower spending, higher taxes, and privatization. This fiscal policy response failed and alternately aggravated the economic downturn, plunging into a recession (Izaguirre & Rao, 2000).

The aftermath of the AFC caused a large decline in private participation in PPP projects (Figure 1). Studies suggest that the largest contribution to this drop came from reduced investments by advanced countries in emerging market PPPs, which, in turn, became more reliant on the mobilization of domestic sources of financing. However, local financial institutions are usually underdeveloped and too small to generate enough savings to finance large-scale projects. Developed country financiers often come in ventures that include private operators, who bring skills and technical expertise that might not exist in the local market (Burger et al., 2009).

Similarly, the 2007-08 GFC had an immediate and negative impact on the worldwide financial market and, thus, on the financing of PPPs, caused by upward pressure on interest rates; decrease in credit

availability; exchange rate movements, and lower demand for services impacting projects' cash flows (Yuan, Wang, Skibniewski & Li, 2012; Burger et al., 2009). The crisis unleashed high levels of risk aversion, resulting in many states adopting macroprudential financial policies to ensure the financial system's stability as a whole (Claessens, Kose, Laeven & Valencia, 2014; Connolly & Wall, 2011). This inherently restrained the inflow of capital into their economies and government bailouts incentivized economic agents to lend in their domestic economies (Beck et al., 2020; Loxley, 2012). Although the GFC hit drastically the financial market, many governments increased their interest in adopting public-private partnerships (PPP) to minimize their infrastructure deficit (Chan & Osei-Kyei, 2015), by implementing financial and institutional measures to attract private investments.

Finally, the COVID-19 pandemic catastrophically impacted the world in an unprecedented manner at a time when globalization was already under serious threat. COVID-19 produced synchronized shocks to the global supply chains that reverberated with profound consequences for global business, internationalization, value chains, strategy, management, and international trade and investment patterns. Lockdowns and a sharp drop in consumer spending led to unprecedented unemployment rates worldwide, in which millions of full-time jobs suddenly disappeared (Financial Times, 2020). Governments immediately released stimulus spending to unprecedented levels, just as tax revenues have plummeted (Assi, Calan, Kaul, and Vincent, 2020; Brinded, Cutler, Kok, and Parbhoo, 2020). Some countries monetized debt through central banks, while others opted for additional borrowing or considered other measures to reduce deficits, such as selling off assets (Assi et al., 2020). While governments worked to manage record fiscal deficit levels, they were also seeking to restore economic growth (Rahemtulla, Sampath & Gin, 2020, World Bank, 2020; Perez-Gorozpe, 2020).

Managing the COVID-19 crisis has proven to be extremely challenging for all governments (World Economic Forum, 2020; Grover, Rahemtulla, et al., 2020). McKinsey (2020) expects a worldwide public deficit of up to \$30 trillion by 2023 and S&P forecasts a rise in debt-to-GDP ratios from an average of 105% in 2019 to approximately 125% by 2023. Low real interest rates will keep asset prices high even if economies remain weak. Inflation can spike, and, at the same time, governments have to implement measures to alleviate its impact, responding quickly to high levels of unemployment, and safeguarding their population's health through vaccination campaigns.

Thus, considering the CSF presented in Table 2, whether exogenous or endogenous, it is coherent to argue that during times of global crisis, the most influencing factors that impact the execution of PPPs are related to exogenous factors. However, the institutional quality, the legal framework, political system, and government support are country-specific characteristics that do not necessarily suffer a sudden disruption in times of global crisis. As evidenced from the three aforementioned crises, the disruptions they caused immediately and directly impacted the macroeconomic stability worldwide including the downturn in GDP growth, increase in government debt, and a spike in unemployment and inflation rates. As presented in Table 3, the macroeconomic risk factors are associated with global crises.

## **Globalization and PPP**

Globalization is a multidimensional process that involves much more than the global trade of goods, services, capital, and labor. In International Business, globalization is commonly defined as the process of increasing interdependence and integration among nations. Gygli, Savina, Haelg, Potrafke, and Sturm (2019) argue that globalization is also associated with governments working together to work on political problems of global nature. Getting deeper into the role of states in globalization, Tijani (2010) suggests that globalization is an economic and political regime brought by capitalist economies that support the economic ideology of liberalization, privatization, and regulation. Consequently, when the activities and powers of the state decrease, there is an increase in the orchestration of global trade by the private sectors (Krzes-Dobieszewska, 2014). PPPs, which constitute a hybrid type of governance, are an expression of the ongoing reconfiguration of authority in world politics (Schaferhoff, Campe, and Kaan, 2009).

The waves of globalization during the past 200 years not only continue to evolve but are also able to reinvent themselves in different forms (van Bergeijk, 2017). In recent years it has become evident that globalization in its basic framework is so profoundly modified that one should speak of a new, next-

civilization paradigm. The fast-growing dynamics of global processes are driving the world into an unknown and unpredictable direction, characterized by volatility and uncertainty toward globalization underpinned by three pillars: economic, social, and political.

In times of crisis, states have to limit their activities; prioritizing projects and delivering public services only to a limited extent. Therefore, in many countries, anti-crisis actions include stimulation of the economy by increasing the role of private capital in financing public investments and services, enabling states to perform their primary responsibilities of providing necessities of life to the people and be responsive to them (Krześ-Dobieszewska, 2014). This translates into a collaboration between the state (public) and the society (private). In this sense, globalization seems to have a significant and close relationship with public and private partnership agreements.

## **HYPOTHESES, DATA, AND METHODOLOGY**

In the previous section, we identified the most vulnerable factors that influence the use of PPPs to finance public infrastructure projects in times of global crisis. Existing studies provide extensive evidence that global financial crises, such as the 1997-98 AFC and the 2007-08 GFC caused a significant impact on foreign direct investment, in global GDP, in government debt, in unemployment rates, in private actors' appetite to risk, in the patterns of international trade and investment (Krześ-Dobieszewska, 2014; Burger et al., 2009; Reeves et al., 2017; Gabriela et al., 2010; Loxley, 2012; Connolly et al., 2011; Guellec et al., 2009). The COVID-19 global crisis seems to follow the same path (Rahemtulla et al., 2020; Assi et al., 2020; Grover et al., 2020). Thus, it is expected that a macroeconomic environment characterized by instability due to sudden disruption may reduce the likelihood of the execution of PPPs.

### **Components of Macroeconomic Environment Stability**

Measuring macroeconomic environment stability is a complex and challenging task. The World Economic Forum, in its annual report known as the Global Competitiveness Index, classifies all countries worldwide based on 12 pillars, in which the macroeconomic stability – pillar 4 – is underpinned by two indicators: inflation rate and public debt, while the nominal GDP of a country is under pillar 10 – market size, the share of a country's GDP as a percentage of the world total GDP is classified as a contextual indicator, and the unemployment rate is classified as a social indicator (World Economic Forum, 2020).

According to the United Nations (2016), “the types of indicators typically used to assess national macroeconomic stability are price inflation, growth in real GDP, changes in employment/unemployment, current account volatility, the health of government finances, interest rate volatility (and government bond yields), and exchange rate stability”. The European Union defined macroeconomic stability in law (the Maastricht Treaty) as comprising of four criteria and five indicators: low and stable inflation; low long-term interest rates; low national debt relative to GDP; low deficits; and currency stability. Following the GFC, the European Union extended the Maastricht Treaty to other indicators, such as export market share, private sector debt, house prices, unemployment, participation rates, and labor costs, labor productivity, residential construction, poverty, deprivation, and social exclusion, spending on research and development, foreign direct investment flows and stocks, gross fixed capital formation, and GDP. “The European approach illustrates the interconnectedness of the real and financial economies with society and the number of factors that may influence macroeconomic stability” (United Nations, 2016).

Considering the abovementioned indicators, our research adopted four indicators to classify macroeconomic environment stability: Government Debt, Inflation Rate, Unemployment Rate, and GDP Growth.

### **Hypotheses**

Based on the literature review, PPP is an alternate mechanism for governments to restimulate their economic growth and address the rise of public debt by attracting private investors to invest in infrastructure and create new job opportunities. However, PPP investment is sensitive to many factors. As the vast literature shows, macroeconomic environment, institutional and regulatory conditions, corruption, market

size, the rule of law, accountability and transparency of governments, governance, administrative capacity, contract design, and financing methods are critical factors that influence the success of PPPs (EIU 2014; World Bank, 2016; Leigland, 2018; Hilmarsson, 2012; Bhavani, 2019). The majority of these factors, though, are country-specific and can be improved by governments who are willing to create a favorable business environment to attract private investments. However, in times of global crisis, governments are less capable of controlling the macroeconomic conditions, becoming extremely vulnerable to external factors.

As many studies suggest, a stable macroeconomic environment is crucial for attracting private investors to cooperate with the public sector to address government responsibilities (Mota et al., 2015; Chou et al., 2015; Mostaan et al., 2017; Leigland, 2018; Hilmarsson, 2012; Amponsah et al., 2019). Due to unstable macroeconomic conditions, private investors become more averse to risk, prioritizing short-term contracts and contracts free of risk associated with customers' ability to pay for services, while financial institutions prioritize short-term loans, and increase credit margins and costs associated with raising capital (Guellec et al., 2009; Krześ-Dobieszewska, 2014; Burger et al., 2009; Gabriela et al., 2010).

In addition, as literature shows investing in PPPs in emerging economies has some considerable challenges. Lack of planning (World Bank, 2016), volatility in the population's willingness to pay for the public asset or service delivery (Amponsah et al., 2019), and the strong inclination for governments to transfer the risks to the private partner (Hilmarsson, 2012; EIU, 2014; Leigland, 2018), impact in the appetite of investors and financial institutions to engage in PPPs.

In times of global crisis, this risk aversion becomes even stronger. The large number of variables influencing the PPP market requires governments to be prudent when adjusting their strategy, due to their impact on assets, liabilities, income, expenditure flows, profitability, investment decisions, solvency, and liquidity of a PPP (Guellec et al., 2009). Therefore, governments must act immediately to establish policies that promote a trust-based environment where the private sector can rely on, in case they want to counteract downfalls and protect vulnerable populations from unemployment or income decline (Krześ-Dobieszewska, 2014). In sum, a stable macroeconomic condition is vital for the execution of a PPP and for engaging the private sector in these projects.

Thus, this paper identifies the four macroeconomic environment stability-related factors that are hypothesized to affect the execution of PPPs: GDP Growth rate (GDP\_GROWTH), Unemployment Rate (UNEM\_RATE), Inflation Rate (INFL\_RATE), Government Debt as a percentage of GDP (DEBT). The conceptual model is presented in Figure 3.

In terms of the sign of the constructs, the greater is the macroeconomic environment instability the lower is the likelihood for the execution of PPPs, in other words, higher values in Gross Government Debt, Inflation Rate, Unemployment Rate, indicate a lower likelihood for the execution of PPPs, while lower GDP growth reflects lower likelihood for the execution of PPPs.

***H1: The greater is Government Debt the lower is the likelihood for the execution of PPPs.***

***H2: The greater is the Inflation Rate the lower is the likelihood for the execution of PPPs.***

***H3: The greater is the Unemployment Rate the lower is the likelihood for the Execution of PPPs.***

***H4: The lower is the GDP Growth, the lower is the likelihood for the Execution of PPPs.***

The PPI World Bank database provides historic series of PPP projects in EMDE, based on variables such as the infrastructure sector, year of investment, type of contract, and participation of Multilateral Development Banks (MDBs). In this study, PPP execution refers to the sum of investment in physical assets and payments to the government as a percentage of GDP, based in US dollars, in the financial closure year, covering projects in the energy, transport, water and sewerage, ICT, and municipal solid waste sectors.

Despite the potential relationship between the macroeconomic environment and the execution of PPPs, this research also suggests that globalization trends may influence this relationship. This is because the

increase in cross-border flows of goods, services, capital, and labor and the greater interdependence and integration among nations can facilitate the PPP market, through an increase in foreign direct investment, greater appetite to risk, ease export of skilled workers, and an increase in global trade (Figge & Martens, 2014; Antràs, 2020; Kim, Li, & Lee, 2020; Scott & Wilkinson, 2021). According to Hodge & Greve (2018), it is common to find global corporations heading PPP projects.

As trade openness, liberalization, and high levels of direct foreign investment reflect a country's economic globalization level, government policies that promote free trade, deregulation, and price controls tend also to downsize or privatize public assets or services. In this sense, when countries are facing unstable or negative macroeconomic conditions due to external forces such as a global crisis, their initiatives to facilitate global trade and foreign direct investments can reduce the negative impact on PPP investment. As many authors argue, PPP projects are most effective in countries that foster transparency with minimum political interferences (Rebeiz, 2012; Babatunde et al., 2015; Chou et al., 2015; Mostaan et al., 2017; Leigland, 2018; Hilmarrsson, 2012; Amponsah et al., 2019; Tang et al, 2010) and higher economic freedom (Mota et al., 2015).

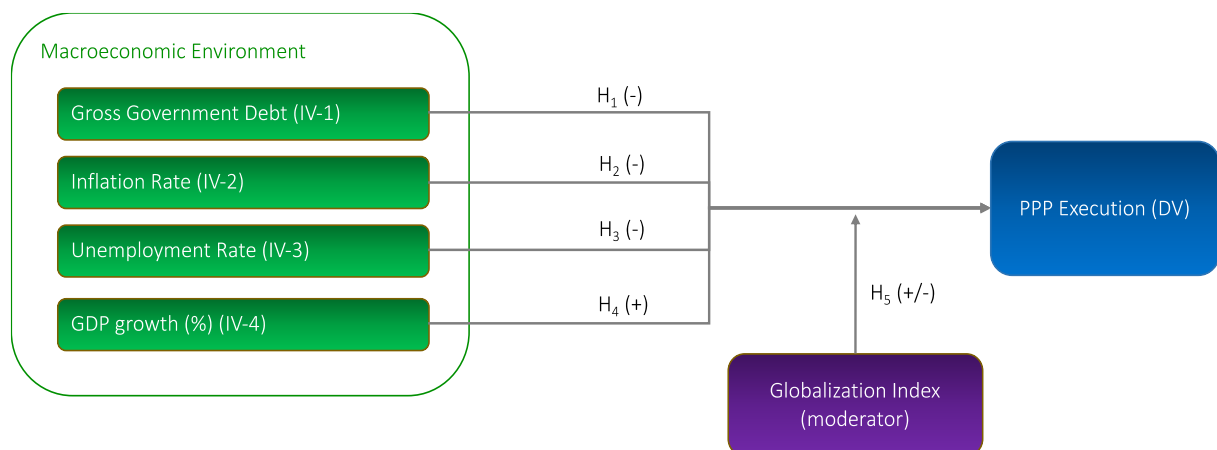
Thus, this research suggests that globalization has a moderating effect on the relationship between the macroeconomic environment instability and the execution of PPPs, such as that a high level of globalization can alleviate the negative impact of an unstable macroeconomic condition and the low likelihood of PPPs execution:

**H5a:** *The higher is the globalization index of a country the weaker is the relationship between high levels of (i) Gross Government Debt, (ii) Inflation Rate, (iii) Unemployment Rate, low (iv) GDP Growth rate, and the execution of PPPs.*

**H5b:** *The lower is the globalization index of a country, the stronger is the relationship between high levels of (i) Gross Government Debt, (ii) Inflation Rate, (iii) Unemployment Rate, low (iv) GDP Growth rate, and the execution of PPPs.*

The KoF globalization index defines three dimensions for measuring globalization: economic, political, and social. Economic globalization characterizes long-distance flows of goods, capital, and services and information and perceptions accompanying market exchanges. Social globalization expresses the spread of ideas, information, images, and people. Political globalization characterizes the diffusion of government policies (Gygli, Savina, Haelg, Potrafke, and Sturm, 2019). This study used the overall KOF Globalization Index, calculated as the average of the de facto and the de jure Globalization Index, to measure globalization.

**FIGURE 3**  
**CONCEPTUAL MODEL**



## Data

The paper utilizes PPP projects data from the World Bank PPI database. The database records infrastructure projects mainly from developing countries (World Bank, 2017). The data are subsequently investigated through various statistical methods.

Six constructs were introduced in this paper including GDP Growth rate (GDP\_GROWTH), Unemployment Rate (UNEM\_RATE), Inflation Rate (INFL\_RATE), Government Debt as a percentage of GDP (DEBT), PPP Investment as a percentage of GDP (INV\_GDP), and Globalization (GBLINDEX). The selected indicators for the first 4 constructs were obtained from the IMF database. The PPP Investment as a percentage of GDP was calculated based on the World Bank's database of PPP investment and total GDP per country. Finally, the globalization index was obtained from the KOF Index of Globalization. The description of each variable and source are available in table 4.

**TABLE 4**  
**SOURCE AND DESCRIPTION OF EACH VARIABLE**

Variable	Description	Source
Government Debt (% of GDP)	Refer to all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future, including debt liabilities, currency and deposits, debt securities, loans, insurance, pensions, and standardized guarantee schemes, and other accounts payable.	IMF
GDP Growth (%)	Refer to the growth per year of the monetary value of final goods and services produced in a country. It counts all of the output generated within the borders of a country.	IMF
Unemployment Rate	The number of unemployed persons as a percentage of the labor force (the total number of people employed plus unemployed).	IMF
Inflation Rate	The average consumer price index (CPI) is a measure of a country's average level of prices based on the cost of a typical basket of consumer goods and services in a given period. The rate of inflation is the percent change in the average CPI.	IMF
PPP Investment	The sum of investment in physical assets and payments to the government in the financial closure year <sup>1</sup> . Investments are recorded in millions of US dollars.	PPI World Bank Database
Globalization	KOF Globalization Index calculated as the average of the de facto and the de jure Globalization Index	KoF Index

The sampling period was defined based on the availability of data and based on a timeframe that can encompass the major crises related to this study: AFC, GFC, and COVID-19. For a better analysis of the hypotheses in each crisis, the total period under study was split into 3 different time series: (1) from 1991-2001, including the AFC; (2) from 2002-2012, which includes the GFC and (3) from 2013-2019, which includes the outbreak of COVID-19 crisis.

Considering that in the past decade, EMDEs have grown faster than advanced economies, reaching above 60% of global GDP, due to the globalization of trade and financial flow into developing economies (IMF, 2020), the sample of this research was established based on the emerging countries that received higher foreign direct investments, which are: Brazil, India, China, Turkey, Mexico (Figure 2), and to cover all BRICS countries, Russia and South Africa were also added to the sample.

## Methodology

The empirical study utilized multiple data analysis, which allowed us to simultaneously account for the time series, cross-countries and multiple variables of our data. First, we ran our model for the entire time

period TPT (1991-2019) including all 7 countries, to assess the correlation between each independent variable and the dependent variable. Second, we ran the model for each time series: (TP1) from 1991-2001; (TP2) from 2002-2012, and (TP3) from 2013-2019, to assess the correlation behavior between each independent variable and the dependent variable during times of global crisis (TP1, TP2) and non-global crisis (TP3) (Table 6). Due to the small sample size, we could not run the model individually for each country. Finally, we introduced the moderating factor, the globalization index, only to those that presented a significant correlation effect (H1).

To empirically test the formulated hypothesis H1, H2, H3, and H4 and taking into account the defined methodology, the following model was defined as:

$$INV\_GDP = (\beta_0 + \beta_1 DEBT_{ct} + \beta_2 UNEM\_RATE_{ct} + \beta_3 INFL\_RATE_{ct} + \beta_4 GDP_{Growth_{ct}}) \quad (2)$$

The designation of each variable employed in the model and the identification of its sign are presented on Table 5. The suitability of the indicators is confirmed by the confirmatory factor analysis presented in Section 4. To empirically test hypothesis H5 and taking into account the defined methodology, the following model was defined as:

$$INV\_GDP = (\beta_0 + \beta_1 X_{ct} + \beta_2 M_{ct} + \beta_3 XM_{ct} + eINV\_GDP) \quad (3)$$

Chi-square tests were performed for dichotomous variables. Differences were considered statistically significant at a value <0.01. Statistical analyses were performed using SPSS (version 27 for PC; SPSS/IMB Chicago, IL). Moderation analysis for significant results was completed in SPSS (version 27 for PC; SPSS/IBM, Chicago, IL) using the macro PROCESS (Andrew F Hayes, Ohio State University, Columbus, OH). Separate models with a positive correlation used the Globalization Index score as a moderator to test the impact for all significant results.

**TABLE 5  
DESIGNATION OF THE VARIABLES AND EXPECTED SIGNS**

Variable	Variable's designation	Expected sign
INV_GDP	Investment as a percentage of GDP	
DEBT	Government Debt (% of GDP)	-
GDP_GROWTH	GDP Growth (%)	+
UNEM_RATE	Unemployment Rate	-
INFL_RATE	Inflation Rate	-
GBLINDEX	KOF Globalization Index	+ / -

## RESULTS

This section presents the empirical analysis on the execution of PPPs as measured by the total annual investment in PPP as a percentage of GDP (INV\_GDP) across the seven countries (Brazil, China, India, Mexico, Russia, and South Africa) as impacted by changes in government debt, GDP growth rate, inflation, and unemployment rates. The purpose of this analysis is to examine the macroeconomic factors that influence PPP execution between 1991-2019 that includes notable times of global economic disruption. A Pearson product-moment correlation coefficient was computed to assess the relationship between the INV\_GDP with Government Debt, Inflation Rate, Unemployment Rates, and GDP Growth. These correlations were run across the Time Period Total (TPT) including data from 1991-2019. We also examine the execution of PPPs for three sub-period to investigate the impact of time dependencies. Specifically, we run separate correlations across three segments with time period one (TP1) including data from years



leading up to the AFC from 1991-1997. The second period (TP2) represents the years after the AFC and before the GFC from 1998-2008. The third time period (TP3) represents the years after the GFC and before the impact of COVID-19 from 2009-2019.

### **Correlation Analysis of PPPs Execution TPT (1991-2019)**

Our first hypothesis was related to government debt and the execution of PPPs. In particular, we hypothesized that higher government debt is related to a lower likelihood of executing PPPs. A Pearson product-moment correlation coefficient was used to investigate the relationship between DEBT and the INV\_GDP for the period 1991 and 2019. Results did not support H1 which expected a negative correlation. Instead, the analysis of the data produced the opposite impact resulting in a statistically significant positive correlation between DEBT and INV\_GDP,  $r = 0.257$ ,  $n = 202$ ,  $p = 0.000$ . A simple linear regression was carried out to investigate the relationship between DEBT and INV\_GDP. There was a significant positive correlation between the amount of debt in millions of U.S. dollars, ( $M=45.84\%$ ,  $SD=21.9$ ) and the calculated % of GDP invested in PPP ( $M=26.8$ ,  $SD = 37.8$ ),  $r(200) = 0.257$ ,  $p < .001$ . These data predict that for each additional increase of one million U.S. dollars in debt, the calculated percentage of GDP invested in PPPs are likely to get an average increase of 0.444,  $b=0.444$ ,  $t(200) = 3.755$ ,  $p < 0.001$ . These results do not confirm the hypothesis that increased DEBT would result in a reduced percentage of GDP invested in PPP. Indeed, the urbanization increase, population growth, and changes in social structure in the last decades in emerging markets led to an increasing need for investments in infrastructure. However, with budget constraints and fiscal deficit in emerging economies, public debt increased. Governments had no other solution but to attract private investments to finance infrastructure (Amponsah & Bhavari, 2019; Leigland, 2018). In addition, the downturn in the execution of PPPs in the aftermath of both AFC and GFC brought many opportunities for governments to improve the business environment, on their legal, institutional, and governance structures, and improve the attractiveness for private partners to invest in PPPs. Although the AFC boosted the private sector's risk aversion to investing in long-term high-cost projects and although the GFC hit the financial market drastically, many governments increased their interest in adopting PPPs to minimize their infrastructure deficit (Chan et al., 2015), by implementing financial and institutional measures to attract private investments, such as facilitating access to finance and improving the risk-return balance, through concession extension, subsidies, grants, revenue guarantees, exchange rate guarantees, debt guarantees, among others initiatives (Burger et al., 2009).

A Pearson product-moment correlation coefficient was computed to assess the individual relationship for H2 (INFL\_RATE), H3 (UNEM\_RATE), and H4 (GDP\_GROWTH) and the PPP execution (INV\_GDP) for the TPT date range. Results for all these did not support the hypothesis of a lower execution of PPP with results showing no correlation between each variable associated with H2 (INFL\_RATE),  $r = -0.123$ ,  $n = 202$ ,  $p = 0.081$ , H3 (UNEM\_RATE)  $r = -0.064$ ,  $n = 203$ ,  $p = 0.364$ , and H4 (GDP\_GROWTH),  $r = -0.123$ ,  $n = 202$ ,  $p = 0.081$ .

### **Sub Period Correlation Analysis of PPPs Execution**

Similar correlation analyses were run across TP1, TP2, and TP3 for H1, H2, H3, and H4 to investigate the impact of each variable on PPP Execution (INV\_GDP) to identify the impact during times of noted financial crisis. The impact on PPP execution following the AFC in TP2 and the GFC in TP3 was observed, as well as notable impacts on foreign investment, global GDP, unemployment rates, and the GDP of individual countries. These periods of economic disruption resulted in reduced investment by private parties which in turn impacted the need for more PPP (Krześ-Dobieszewska, 2014; Burger et al., 2009; Reeves et al., 2017; Gabriela et al., 2010; Loxley, 2012; Connolly et al., 2011; Guellec et al., 2009). Examining these periods individually provides a more focused perspective on the macroeconomic environment and the impact on PPP execution.

#### *Pre AFC: TP1 (1991-1997)*

Unlike the cumulative analysis of the full data set, TP1 showed no correlation between the DEBT and INV\_GDP,  $r = 0.111$ ,  $n = 46$ ,  $p = 0.454$ . TP1 represents a period of relative stability when compared to TP2

and TP3. The impact of government debt levels during this time of reduced economic disruption suggests that the need for PPP execution is not as great as governments may be willing to retain the risk of PPP backed projects with limited need to transfer risk to private entities (Hilmarsson, 2012; EIU, 2014; Leigland, 2018).

Analysis of TP1 variables associated with H2, H3, and H4 showed no correlation between the INFL\_RATE and INV\_GDP,  $r = -0.184$ ,  $n = 49$ ,  $p = 0.205$ , UNEM\_RATE and INV\_GDP,  $r = -0.237$ ,  $n = 49$ ,  $p = -0.111$ , or GDP\_GROWTH and INV\_GDP,  $r = 0.247$ ,  $n = 49$ ,  $p = 0.087$ . Similar to the lack of correlation between DEBT and INV\_GDP, this analysis suggests that for the selected emerging countries for this study, none of the included variables has a statistically significant impact on PPP execution.

#### *Post AFC: TP2 (1998-2008)*

Following the AFC analysis of the data produced results for TP2 that reflected a moderate positive correlation at the 0.05 level for H1 between DEBT and INV\_GDP,  $r = -0.285$ ,  $n = 77$ ,  $p = 0.012$ . TP2 also produced a negative correlation at the 0.05 level for H3 between UNEM\_RATE and INV\_GDP,  $r = -0.249$ ,  $n = 77$ ,  $p = 0.029$ . TP2 represents a time of economic crisis where governments had to prioritize needs while simultaneously private investors became more risk-averse. This is especially true in emerging economies where macroeconomic conditions were more unstable and vulnerable, leading governments to improve the business environment and attract private investment. Thus, many improvements were made to facilitate PPP projects. Also, since the AFC crisis hit more drastically the Asian emerging countries, while advanced economies were less impacted, and considering that the majority of foreign direct investments in the Asian region came from the advanced economies, private investors from the western advanced countries saw an opportunity to invest in the Asian emerging markets, due to currency depreciation, especially in the form of privatization. In addition, in the 1990s, emerging economies started receiving more attention from multilateral development banks, encouraging governments to mobilize infrastructure and private investors to finance them (Bayliss et al., 2018; Hilmarsson, 2012, Arezki, Bolton, Peters, Samama, & Stiglitz (2017). Thus, the positive correlation between DEBT and INV\_GDP and a negative correlation between UNEM\_RATE and INV\_GDP in the aftermath of the AFC can partly be explained by these factors. The rise in debt led to increased execution of PPPs, which led in part to a reduction in unemployment rates.

Analysis of the remaining variables associated with H2 and H4 showed no correlation between the INFL\_RATE and INV\_GDP,  $r = -0.206$ ,  $n = 77$ ,  $p = 0.072$ , or GDP\_GROWTH and INV\_GDP,  $r = -0.139$ ,  $n = 77$ ,  $p = 0.229$ . This lack of correlation suggests that the impact of inflation rates and the GDP growth of the selected countries during the time following a financial disruption do not have an impact on PPP execution, which is driven more by other factors of the macroeconomic environment including regulatory conditions, transparency of governments and financing methods (Leigland, 2018; Hilmarsson, 2012; Bhavani, 2019).

#### *Post GFC: TP1 (2009-2019)*

An even stronger positive correlation at the 0.01 level was found in TP3 for H1 specific to DEBT and INV\_GDP,  $r = -0.420$ ,  $n = 77$ ,  $p = 0.000$ . TP3 represented the years following the GFC where countries took on more debt, partly to cover the cost of additional PPPs to minimize infrastructure deficit by implementing financial and institutional means to engage more with private investors (Chan & Osei-Kyei, 2015). EMDE Investment in PPP showed continued growth starting in 2005 and continued through the GFC until 2013, which started fluctuating through 2018 (Figure 1). The actions of EMDE following the GFC stimulation of the economy by utilizing available private capital to finance public investments allowed governments to respond to the needs of the economy and their domestic population (Krzes-Dobieszewska, 2014). Increased debt during a time of crisis leads to increased PPP execution, which during TP3 was impacted by increased globalization and international partnerships between the public and private sectors.

Analysis of the remaining variables associated with H2, H3 and H4 showed no correlation between the INFL\_RATE and INV\_GDP,  $r = 0.158$ ,  $n = 77$ ,  $p = 0.170$ , INFL\_RATE and UNEM\_RATE,  $r = 0.165$ ,  $n = 77$ ,  $p = 0.150$ , or GDP\_GROWTH and INV\_GDP,  $r = -0.033$ ,  $n = 77$ ,  $p = 0.774$ . Unlike TP2, the data shows no correlation between UNEM\_RATE and INV\_GDP. This lack of correlation between

unemployment and PPP execution for TP3 may be due in part to how governments prioritized PPP projects by considering the larger impact of project selection, including employment creation, expansion of existing services, delivery of new services, and generation of tax revenue (Burger, et al., 2009; Gabriela et al., 2010, Reeves et al., 2017). Although unemployment is a consideration in PPP project execution, it is weighted against other competing factors for governments to consider.

Analysis of the remaining variables associated with H2 and H4 showed no correlation between the INFL\_RATE and INV\_GDP,  $r = -0.158$ ,  $n = 77$ ,  $p = 0.170$ , or GDP\_GROWTH and INV\_GDP,  $r = -0.033$ ,  $n = 77$ ,  $p = 0.774$ . Similar to TP2, the analysis of TP3 data suggests that the impact of inflation rates and the GDP growth on PPP execution is driven by other factors within the larger economic environment.

**TABLE 6**  
**PEARSON CORRELATION & SIGNIFICANCE**

Time Period	Variable	Correlations	INV_GDP	GDP Growth	Inflation	Unemployment
TPT (1991-2019)	INV_GDP	Pearson's correlation coefficient (r)	1	0.024	-0.123	-0.064
		Sig. (2-tailed)		0.733	0.081	0.364
		N	203	203	203	203
TP1: (1991-1997)	INV_GDP	Pearson's correlation coefficient (r)	1	0.247	-0.184	-0.237
		Sig. (2-tailed)		0.087	0.205	0.102
		N	49	49	49	49
TP2: (1998-2008)	INV_GDP	Pearson's correlation coefficient (r)	1	-0.139	-0.206	-.249*
		Sig. (2-tailed)		0.229	0.072	0.029
		N	77	77	77	77
TP3: (2009-2019)	INV_GDP	Pearson's correlation coefficient (r)	1	-0.033	0.158	0.165
		Sig. (2-tailed)		0.774	0.17	0.15
		N	77	77	77	77

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

### Impact of Globalization Index Score as a Moderator

**H5a:** *The higher is the globalization index of a country the weaker is the relationship between high levels of (i) Gross Government Debt, (ii) Inflation Rate, (iii) Unemployment Rate, low (iv) GDP Growth rate, and the execution of PPPs.*

**H5b:** *The lower is the globalization index of a country, the stronger is the relationship between high levels of (i) Gross Government Debt, (ii) Inflation Rate, (iii) Unemployment Rate, low (iv) GDP Growth rate, and the execution of PPPs.*

Analysis of the Globalization Index Score as a moderator of all variables and the execution of PPP as measured by INV\_GDP was performed using the PROCESS add-on for SPSS by Andrew Hayes was used for these analyses. The confounding variables included in the model for H1 specific to Government Debt due to their significant ( $p < 0.05$ ) correlations with the main variable of INV\_GDP. The interaction variable INT\_1, which is calculated as (Government Debt) x (GBLINDE), produces a positive simple slope of GDP\_INV,  $r = 0.06$ ,  $n = 203$ ,  $p = 0.007$ . Additionally, the breaking down the correlations across 16th, 50th, and 84th percentiles reflect an increased impact on GDP\_INV as the GBLINDEX increases (Table 7). Emerging economies (EEs) have progressively increased their role in the global economy and their importance has grown along different dimensional paths, including foreign direct investments and portfolio investments, total currency reserves, and in more general terms, their shares in international commercial and financial trade (Pesce, 2017). These results suggest that the impact of Government Debt on GDP\_INV is positively impacted as the Globalization Indexes of the EEs improved over the past decades. A similar analysis was run for UNEM\_RATE, INFL\_RATE, and GDP\_GROWTH to explore the impact of GBLINDEX as a moderator on INV\_GDP. Each of these analyses showed no the GLBLINDEX had no impact on INV\_GDP (Appendix A.3)

**TABLE 7**  
**GLOBALIZATION INDEX AS MODERATOR**

**Model Summary**  
**(DEBT)**

R	R-sq	MSE	F	df1	df2	p
0.29	0.09	1353.87	5.92	3.00	191	0.0007

**Model**

	coeff	se	T	p	LLCI	ULCI
Constant	51.71	34.64	1.49	0.14	-16.62	120.03
DEBT	-0.91	0.68	-1.34	0.18	-2.26	0.43
GBLINDEX	-0.81	0.58	-1.39	0.17	-1.95	0.34
Int_1	0.02	0.01	2.05	0.04	0.00	0.05

Int\_1: (DEBT) X (GBLINDEX)

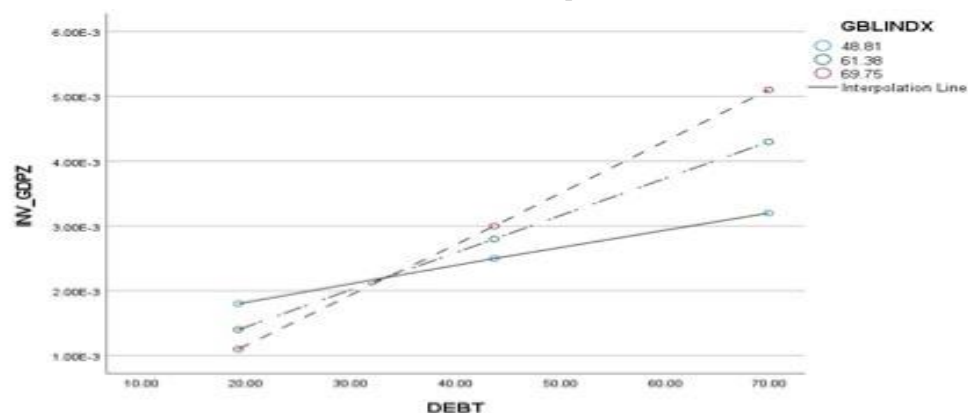
**Test(s) of highest order unconditional interaction(s):**

	R2-chng	F	df1	df2	p
Int_1	0.02	4.20	1.00	191	0.41

**Conditional effects of the focal predictor at values of the moderator(s):**

	GBLINDEX	Effect	se	t	p	LLCI	ULCI
16th percentile	48.81	0.28	0.15	1.83	0.07	-.002	0.58
50th percentile	61.38	0.59	0.14	4.21	0.00	0.31	0.86
84th percentile	69.75	0.79	0.20	3.87	0.00	0.39	1.19

Level of confidence for all confidence intervals in output: 95.0



## DISCUSSIONS, IMPLICATIONS, AND FUTURE RESEARCH

Before the 1980s, governments from emerging countries advocated more for privatizations. No business environment, governance structure, or secure arrangements enabled PPPs, at a time when economic freedoms were also a bottleneck. According to Bayliss & Van Waeyenberge (2018), the advent of PPPs appeared alongside a glut in global savings through an increase in public service provisions in developing countries, which created financing arrangements to facilitate entry opportunities for financial investors into the infrastructure sector. By the 1990s these developing countries started facing population growth due to urbanization, with consequent GDP growth, changes in social structure, and an increase in population's willingness to pay for a public asset and service delivery, that led to higher pressure towards governments to promote investments in infrastructure (Rebeiz, 2012; Gurara et al 2017). Rising budget constraints, fiscal deficit, and public debt pushed governments to attract private investments to finance the population's needs (Amponsah & Bhavari, 2019; Leigland, 2018). Thenceforward, many governments in emerging economies started to implement initiatives to facilitate PPPs, with support of the World Bank, other multilateral development institutions, bi-lateral donors, and various other organizations (Bayliss & Van Waeyenberge, 2018; Hilmarsson, 2012; Arezki, Bolton, Peters, Samama, & Stiglitz, 2017).

Thus, there was a positive relationship between government debt and the execution of PPPs, as opposed to H1. In times of a global crisis, this scenario becomes even worse, since governments have to adopt urgent measures to address the root of the crisis, becoming more dependent on the private sector to invest and promote infrastructure to attend to population needs (Krześ-Dobieszewska, 2014; Burger et al, 2009). This is why many improvements in the PPP market were seen in the aftermath of a global crisis (e.g. AFC and GFC).

Although the literature shows that macroeconomic instability tends to disfavor the business environment for private sectors to invest in public responsibilities (Mota et. al. 2015; Chou et. al. 2015; Mostaan et. al., 2017; Leigland, 2018; Hilmarsson, 2012; Amponsah et al., 2019), and although a high rate of unemployment is an indicator of socioeconomic instability, this research did not find support in the relationship between unemployment rates and the execution of PPPs. This may be justified because unemployment rates vary significantly between the countries assessed. While China, India, and Mexico present a steady and small growth in the unemployment rate, South Africa, Brazil, Russia, and Turkey present a strong variance of unemployment rate throughout the whole time period. The same can be observed for the inflation rate, in which China is the only country presenting a more stable inflation rate since 1997. All other countries – Brazil, India, Mexico, Turkey, Russia, South Africa present a high variance throughout the entire period analyzed. Thus, future research in the relationship between unemployment rate, inflation rate, and the execution of PPPs can be analyzed per country. Similarly, no support was found between GDP growth and the execution of PPPs. This can be justified by the fact that investments in emerging countries remain very low in absolute numbers and as a percentage of GDP.

Finally, in the hypothesized model, it is suggested that globalization trends can moderate the impact of macroeconomic environment stability in the execution of PPPs. Indeed, the participation of emerging markets in the global economy has progressively increased in the last three decades, strengthening the attractiveness for foreign direct investment and increasing their share in the international commercial and financial trade, in addition to increasing demand for infrastructure. These outcomes drive governments to take a more liberal regime, which favors their business environment and private investors' attractiveness to engage with the public sector. Notwithstanding, before the outbreak of the COVID-19 global crisis many countries were already living an era of increased nationalism, protectionism, populism, trade wars, and income inequality, reflecting a deglobalization movement. If these movements remain the same or even increase, the environment for the execution of PPPs will have a strong negative impact. Perhaps this was the most important finding in this research.

## CONCLUSION

While PPPs are a relatively recent alternative for states to deliver public assets and services, their multidimensional character has shown advantages and controversies to its execution, both by public and private sectors.

The foundation of PPP relies on public sector's needs to reorient and restructure public governance, engaging with private sector to build infrastructures and provide public services using the financing capacities and the management of the private sector.

Even if the expansion of PPPs is a well-accepted reality, the study of the supporting factors of these deals, regardless of the private or public sector point of view is still controversial, especially in the emerging markets. In times of global crisis, in which global macroeconomic instability is naturally perceived, waves of contraction in PPP execution are observed. It is not clear, though, whether these trends are related to macroeconomic instability. This research was conducted to address this gap, i.e., to identify which macroeconomic variables impact PPPs' execution during times of global economic disruption in the emerging markets context. This paper has investigated the impacts of the major economic crises on private investors' appetite to assume a PPP contract with the public sector, and governments' willingness to decentralize.

The results of this study provide an interpretation of the main drivers of PPP execution in times of a global crisis that push both public and private sectors to embrace this kind of partnership. This study reveals the importance that macroeconomic variables – gross government debt, inflation rate, unemployment rate, and GDP growth rate – have in establishing PPPs. Moreover, one of this study's major contributions is that globalization has an important impact on the relationship between macroeconomic instability and PPPs execution, more significantly to the public debt. The negative impact gross government debt has on PPP execution can be alleviated by the globalization trends of a country. Countries with a more liberalized political behavior, favoring the business environment, tend to face fewer challenges in the execution of PPPs when their public debt is relatively high.

The paper provides several contributions to the existing literature and practices. First, this study is the first attempt in the literature to deeply explain the impact of macroeconomic variables in PPPs execution in times of global crises (e.g. AFC and GFC) within the emerging market context (Brazil, China, India, Russia, South Africa, Mexico, and Turkey). The results show that public debt has the strongest correlation with PPP execution in times of a global crisis. Important to highlight though, that the GFC hit the financial system resulting in credit problems for private companies, but much less for governments. COVID-19 crisis hit drastically governments, public accounts, and also private sectors. So the positive correlation between public debt and the execution of PPPs can be stronger in the aftermath of the COVID-19 health crisis due to a spike in public debt.

Secondly, this is the first study to highlight the importance of globalization trends in the attractiveness of foreign investments in PPP. This important contribution shows how a country's openness to trade and attracting foreign investment positively impact PPPs execution. Thirdly, the findings also show that, although unemployment rates tend to decrease when investments in PPP increase, high unemployment rates have no significant correlation with PPP execution, neither have inflation rates. We attributed this finding to the fact that there is a significant variance in both inflation and unemployment rates for the majority of the countries analyzed throughout the period assessed (1991-2019). And since the sample size becomes too small if we analyze each country's correlation, we could not confirm our rational explanation. Future studies may extend the analysis to understand the relationship between unemployment, inflation rates, and PPPs execution. Also, researchers may explore the possibility of generalizing the findings into developed economies.

## ENDNOTES

1. The year in which private sponsors agreed to a legally binding agreement to invest funds or provide services.
2. In this model,  $\beta_k$  values represent the coefficients of the independent variables,  $c$  represents the country and  $t$  represents the temporal time series (TP1, TP2, TP3).
3. In this model,  $\beta_k$  values represent the coefficients of the independent variables,  $c$  represents the country and  $t$  represents the temporal time series (TP1, TP2, TP3).  $X$  represents the causal influence of each variable on  $INV\_GDP$  as reflected in the model.  $M$  represents the moderated influence between  $X$  and  $INV\_GDP$ .

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## APPENDIX 1: DESCRIPTIVE STATISTICS OF YEARLY TOTAL PPP INVESTMENT

(1991–2019) and yearly global GDP growth rate, unemployment rate, inflation rate, and government debt (1991–2019) in the developing countries: China, Brazil, India, Mexico, Russia, and South Africa

	PPP Investment (in Million USD)	Global GDP Growth Rate	Unemployment Rate	Inflation Rate	Government Debt	Globalization
Mean	3636	4.11	9.55	53.78	9.55	59.27
Median	1484	4.4	6.37	6.9	6.37	61.3
Standard Deviation	6048	4.52	7.98	243.78	7.98	9.51
Range	44999	29	30.89	2077.2	30.89	39.95
Minimum	0	-14.5	2.4	-1.4	2.4	32.63
Maximum	44999	14	33.29	2075.8	33.29	72.58
Sum	738176	835	1939.61	10917.8	1939.61	11617.4
Coefficient of variation	1.66	1.1	0.84	4.53	0.84	0.16

(Source: Calculated by authors, based on World Bank Database and International Monetary Fund)

## APPENDIX 2: LINEAR REGRESSION AND CORRELATION ANALYSIS

### Descriptive Statistics

	Mean	Std. Deviation	N
INV_GDP	26.86	37.86	202
DEBT	45.84	21.90	202

### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F	df1	df2	Sig. F Change
1	.257 <sup>a</sup>	0.066	0.061	36.69	0.066	14.10	1	200	0.000

a. Predictors: (Constant), DEBT

### Coefficients<sup>a</sup>

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
						Lower Bound	Upper Bound
1 (Constant)	6.518	6.000		1.086	0.279	-5.312	18.349
DEBT	0.444	0.118	0.257	3.755	0.000	0.211	0.677

a. Dependent Variable: INV\_GDP

### APPENDIX 3: GLOBALIZATION INDEX AS MODERATOR

(INFL\_RATE, UNEM\_RATE, GDP\_GROWTH)

#### Model Summary (INFL\_RATE)

R	R-sq	MSE	F	df1	df2	p
0.15	0.02	1443.76	1.43	3.00	192.00	0.24

#### Model

	coeff	se	T	p	LLCI	ULCI
Constant	33.24	17.77	1.87	0.06	-1.8	68.29
INFL_RATE	0.18	0.20	0.91	0.36	-0.21	0.56
GBLINDX	-0.08	0.30	-0.25	0.80	-0.61	0.51
Int_2	0.00	0.00	-1.01	0.31	-0.01	0.00
Int_2:(INFL_RATE) X (GBLINDX)						

#### Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
Int_2	0.01	1.03	1.00	191.00	0.41

Level of confidence for all confidence intervals in output:95.0

#### Model Summary (UNEM\_RATE)

R	R-sq	MSE	F	df1	df2	p
0.15	0.02	1442.8	1.47	3.00	192.00	0.22

#### Model

	coeff	se	T	p	LLCI	ULCI
Constant	64.15	25.47	2.52	0.01	13.92	114.37
UNEM_RATE	-3.65	1.83	-1.99	0.05	-7.26	-0.04
GBLINDX	-0.59	0.43	-1.35	0.18	-1.44	0.27
Int_3	0.06	0.03	1.83	0.07	0.00	0.12
Int_3:(UNEM_RATE) X (GBLINDX)						

#### Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
Int_3	0.02	3.36	1.00	192.00	0.07

Level of confidence for all confidence intervals in output:95.0

#### Model Summary (GDP\_GROWTH)

R	R-sq	MSE	F	df1	df2	p
0.10	0.01	1462.57	0.58	3.00	192.00	0.63

**Model**

	coeff	se	T	p	LLCI	ULCI
Constant	5.14	24.36	0.21	0.83	-42.9	53.18
GDP_GROWTH	5.18	3.95	1.31	0.19	-2.6	12.97
GBLINDEX	0.36	0.41	0.88	0.38	-0.44	1.16
Int_3	-0.09	0.07	-1.27	0.2	-0.22	0.05
Int_3:(DEBT) X (GDP_GROWTH)						

**Test(s) of highest order unconditional interaction(s):**

	R2-chng	F	df1	df2	p
Int_3	0.01	1.62	1.00	192.00	0.2

Level of confidence for all confidence intervals in output:95.0