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Building infrastructure: Private participation in emerging economies

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Abstract

The importance of physical and social infrastructure for sustenance of high growth rate hardly needs any mention. Infrastructure bottleneck has always been a serious concern and with high growth, the pressure on already deficient infrastructure has increased all the more. As the development of world class infrastructure in tune with the growing needs and also for strengthening and supplementing the existing infrastructure facilities is a herculean task for governments alone especially due to fiscal constraints and other monetary liabilities, Public Private Partnership (PPP) model has emerged and is likely to be encouraged as a preferred mode of funding infrastructure. Brazil, Russian Federation, India and China, popularly known as BRIC countries have embarked on a higher growth trajectory, creating an identity as emerging economies in the global scenario. The present paper studies experiences of private partnership in BRIC. It examines the trend in private investment in infrastructure and the structural shift in infrastructure financing since 1991. It is evident from the trend that the PPP model of financing infrastructure requirements in BRIC has gained momentum. An overview of private partnerships in different infrastructure sectors over the past two decades has been explored. In the global context, BRIC countries' experience in private partnerships in infrastructure development has been talked about. It also investigates challenges in PPP projects in infrastructure sector. Private partnerships offer significant advantages in terms of enhancing efficiency through competition in the provision of services to users. However, success of this mode mainly rests on the environment which not only attracts private investment but also ensures interest of people.

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1. Introduction

Adequate physical infrastructure is a key element of sound investment climate. In the post world war era, most governments entrusted delivery of infrastructure services to state owned monopolies. But providing these services is inherently challenging. Investments are large and lumpy, and often in sunk assets. The cost of maintaining existing infrastructure and undertaking necessary extensions of its coverage is estimated at 7 percent of developing countries' GDP, equivalent to about 600 billion US dollars. Public spending on infrastructure in developing countries is presently around 3 percent. However, emerging economies, in the wake of high growth, need far more financing for infrastructure. As public provision and financing of the vital component was inadequate and also plagued by inefficiency, fiscal pressures and the success of the pioneers of the privatization provided governments with a new paradigm. The trend of liberalization and privatizing infrastructure activities that began in a few countries in the 1970's and 1980's turned into a wave that swept the world in 1990's. Emerging economies have been at the crest of this wave, pioneering better approaches to providing infrastructure services, reaping the benefits of increased competition and customer focus, which have led to higher efficiency and the easing of fiscal constraints. Brazil, Russian Federation, India and China, popularly known as BRIC are among the most important economies in the world which are not members of the OECD. During the past two decades, these countries have rapidly integrated with world economy with opening their economies significantly and reducing trade barriers substantially. Brazil took off with high protectionism in early 1990's and moved along unilateral liberalization. China entered the 1990's with relatively high import tariffs which were then more than halved immediately and then reduced further. India, having highest tariffs among the BRIC in the late 1980's, too implemented ambitious tariff cuts in liberalization period. BRIC have capitalized on opportunities offered by growing importance in world trade. Openness and trade performance made definite impact on the growth spurts. One of the prongs of this new strategy has been attracting private investments in infrastructure which is well reflected in foreign direct investment flowing in primary sectors of these economies.

Table 1. Comparative Infrastructure Indicators

Indicators	Brazil	Russian Fed	India	China	Upper Middle Income Countries	Lower Middle Income Countries	OECD Average
GNI Per Capita (Current US \$)	5,910	7,560	950	2,360	6,720	1,816	33,470
Access to electricity (% of Population)	95	-	43	99	83	62	-
Electric Power Consumption (kwh per capita)	2,008	5,785	480	1,781	2,711	999	8,769
Improved Water Source (% of population with access)	91	97	89	88	93	82	99
Improved Sanitation Facilities (% of pop with access)	77	87	28	65	85	62	-
Telephone Subscriber (per 100 subscriber)	73	137	18	63	87	41	-

Source: Private Participation in Infrastructure (PPI) Database of the World Bank

India and China are lower middle income countries with comparatively poor infrastructure facilities and Brazil and Russian Federation are upper middle income countries with better facilities (Table-1). Amongst BRIC, India does not fare well with lowest percentage of population with access to improved

sanitation and electricity and also with lowest power consumption per head. Not only are the indicators of infrastructure minimum but the difference too, is substantial. It is also evident that all the four countries have to travel a long way to touch OECD average levels. In the above backdrop, the present paper is organized into five sections. Section II briefly summarizes other related studies; Section III discusses the international experiences in private partnerships. Section IV examines the trend in private investments in infrastructure in emerging economies. It also presents an overview of the status of inter sector variations in PPP projects in infrastructure sector. Finally, Section V offers some concluding remarks.

2. Previous Related Studies

There are several studies that address the returns to public infrastructure investments. In general, the results suggest that stock of public infrastructure has a significant positive impact on factor productivity and output. However, with development, returns on infrastructure investment tend to fall. One of the most celebrated studies by Aschauer (1989) estimated a production function and discovered significant contribution of infrastructure in output growth. He suggested that stock of public infrastructure capital is indeed a significant determinant of total factor productivity growth. But it lost its significance in the wake of sophisticated econometric techniques. Munnell (1990a; 1990b; 1992) examined the relationship between public capital and measures of economic activity using US data at the state level. He found that public capital had a significant, positive impact on output. Garcia-Mila and McGuire (1992) and Holtz-Eakin (1993, 1994) introduced the concept of state-level fixed effects which reduced the returns from infrastructural investment. Similar results were obtained by Kelejian and Robinson (1994) and Pereira and Frutos (1995) after some econometric corrections. Nadiri and Mamuneas (1996) using cost function showed that the returns to public infrastructure were comparable to those of private investments. Balmaseda (1996) found that results of Aschauer could be explained by simultaneity and aggregation biases. According to him, the large positive effects of public investment on growth could be reduced to zero, if causality and aggregation biases were taken into account. More recently, Fernald (1999) examined the relationship between infrastructure and productivity. Hardy (1980) first examined the impact of telecommunications on growth in 1980. Based on data from 45 countries, he found the largest effect of telecommunications investment on GDP in the least developed economies and the smallest effect, in the most-developed economies. He concluded that telephone per capita had significant impact on GDP but spread of radio did not have any impact. Norton (1992) underlined the positive and significant contribution of telecommunications variable and concluded that existence of telecommunications infrastructure reduced transaction cost and output rise. Since initial telephone stock is significantly related to the growth, relationship is not reverse causality. More recently, Roller and Waverman (2001) analyzed telecommunications growth as an important factor for economic development. Empirical study by Roller and Waverman (2001), using data from twenty one OECD countries for over 20 years found a significant positive causal link between telecommunications and economic growth. The study indicated that impact of telecommunications is the highest for low income countries and the lowest for the advanced countries. Similar results for roads are found by Fernald (1999) using industry data for the US. Calderon and Servén (2003) present a similar analysis with a focus on Latin America. They found positive and significant output contributions of three types of infrastructure assets – telecommunications, transport and power. Calderon and Servén (2004) further find a robust impact of both infrastructure quantity as well as quality on economic growth and income distribution using a large panel data set encompassing over a hundred countries and spanning over the period 1960-2000. They use a variety of specification tests to ensure that these results capture the causal impact of the exogenous component of infrastructure quantity and quality on growth and inequality.

Historically, provision of infrastructure has been government monopoly but with increasing gap between infrastructure needs and resources available with government to finance it, PPP has emerged as a preferred mode of financing infrastructure. Deloitte discusses this paradigm shift and also the pros and

cons of this newer mode. It also delves upon PPP experience of different countries. The World Bank too has started capturing every minute detail of PPPs in the world. It is also a leading data source for private participation in infrastructure development through its Private Participation in Infrastructure (PPI) Project Database. This database has information on over 4800 projects in different sectors spread across 139 low and middle income countries. In the context of India, two studies related to PPP need mention here. Lakshmanan (2008) provides an analytical abstract of sector wise infrastructure developments in the country and the status of PPP in building such infrastructure. It also raises some specific concerns and generic issues which need attention to attract private investors to participate in infrastructure building. Other study by Kaur et al (2010) details means of financing of infrastructure in India and in this context dwells on the proactive role played by the Reserve Bank of India in the arena of infrastructure financing.

Clarke and Wallsten (2002) highlights inadequacy of public provision of infrastructure services in meeting growing demand thereof mainly due to overstaffing and mismanagement with the exception of Eastern Europe, publicly owned utilities failed to provide service to poor and rural households. More thorough studies of the impacts of privatization have shown that well designed schemes can bring about substantial increases in overall welfare. Private participation in water and sanitation lead to overall domestic welfare benefits of \$ 1.4 billion in Buenos Aires and \$ 23 million in Guinea (Shirley, 2002). Six cases of private participation studied in detail in the telecom, power and port sectors also showed substantial welfare gains to the government, consumers, investors and often, workers (Galal et al 1994; Newbery and Pollitt 1997). These studies have found that the main sources of benefits were increased investment to bring service to new consumers, lower prices, and improved productivity and efficiency. Private participation has been able to improve efficiency through the introduction of incentives to reduce wasteful costs and collect revenues. Some of the largest gains have been seen in the telecommunications sector, where the major driver for improved efficiency has been competition (Ros 1999; Bortolotti et al 2001). Private participation has been catalyst for dramatic improvement in efficiency, often by reducing employment levels, moving to sustainable pricing policies and driving a wedge into political patronage. The most detailed studies of private participation have shown substantial welfare gains (Clive et al 2003). One additional yet significant gain to the host government is in terms of fiscal gain. The gain of tax revenue compares with a situation prior to privatization where losses amounted to as much as 5-6 percent of GDP (Kikeri and Nellis 2002).

2.1. Public Private Partnerships: Global Scenario

Countries all around the globe confront glaring infrastructure deficits. The developed economies are grappling with the problems of high cost of re-investment to replace or modernize the ageing infrastructure while in developing countries the large and growing gap between infrastructure availability and needs is due to higher growth leading to unprecedented demand for infrastructure services in producing goods and services and in maintaining supply and distribution chains efficient, reliable and cost effective. To narrow the infrastructure deficits governments have increasingly turned to PPPs, which once used to be rare and limited to a handful of countries and infrastructure sectors. One offshoot of the rapid worldwide growth of PPPs for infrastructure is that countries remain at vastly different stages of understanding and sophistication in using innovative partnership models. Nonetheless, three distinct stages of PPP maturity can be observed across the world (Figure 1).

Most of the EMEs such as Brazil, China, South Africa, India, and Russian Federation are at stage I of the PPP market maturity curve. In this initial stage, the countries establish policy and legislative framework along with an institutional set-up to guide the implementation of projects. The governments at early stages of PPP maturity curve could benefit from the opportunity to learn from the trailblazers who have moved to more advanced stages, e.g., the United Kingdom for schools, hospitals and defence facilities; Australia and Ireland for roads, etc. Countries in stage II establish dedicated PPP units in agencies and begin developing new hybrid delivery models. In this stage, the PPP market gains depth and

its use is expanded to multiple projects and sectors. Countries also leverage new sources of funds from capital markets. Countries such as Australia and the UK are in the stage III of PPP market maturity curve. In this stage, countries refine innovative models, use more sophisticated risk models with a greater focus on total lifecycle of the projects and develop advanced infrastructure market with the participation of pension funds and private equity funds.

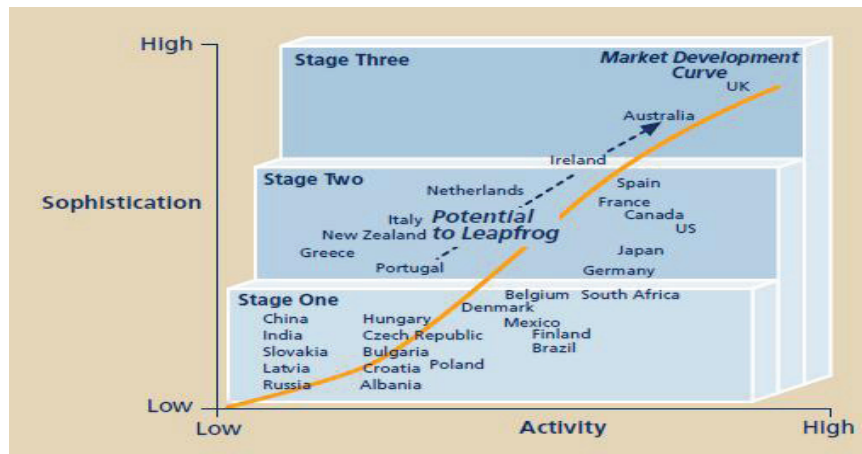


Fig 1. Market maturity curve (Source: Deloitte, Closing the Infrastructure Gap)

According to PPI database (World Bank), between 1990 and 2010 about 4772 infrastructure project have reached financial closure, of which the largest share pertains to Latin America and the Caribbean (31 per cent) followed by East Asia and the Pacific (30 per cent) and the Europe and Central Asia (14 per cent) (Figure 2). Middle East and North African region attracted a meager share of private investment at 3 per cent. Though the Latin American and Caribbean countries have attracted more private projects during the mid- 1990s, the pattern has changed during the recent period towards East Asia and South Asia due to growing investment opportunities in these countries in tandem with their macroeconomic developments.

In terms of investment, region-wise analysis reveals that projects in Latin America and the Caribbean region have attracted a maximum share at 37 per cent between 1990 and 2010 followed by East Asia and the Pacific with 20 per cent and the Europe and Central Asia with 15 per cent in the development of infrastructure with private sector participation (Figure 2). Brazil attracted more investment among the developing countries followed by China, Argentina, Mexico and India. Major share of private investment attracted towards telecom sector in the developing region with a share of 48.9 per cent followed by energy sector (29.3 per cent), transport sector (16.9 per cent) and water and sewerage sector (4.9 per cent).

3. Private Participation: Emerging economies' experience

Planners and policy makers of BRIC too, recognized that infrastructure would be a critical constraint needing quantum investments and removed barriers in early 1990's to welcome private participation backing them with adequate public resources in terms of long term debt and viability gap support. Since then PPPs have gained momentum (Table- 3). According to the PPI database of the World Bank, in a period of two decades (1990-2010) about 3000 infrastructure projects in BRIC have attracted private sector participation which is approximately 50 per cent of the total projects around the globe. In fact, BRIC are the top four countries in terms of number of projects as well as investment in projects (Table-2). In 1990, investment in private infrastructure projects in developing countries was only around US \$ 18

billion. Annual investment grew rapidly, reaching a peak in 1997 of nearly US \$ 130 billion. In Latin America, Argentina and Brazil and in East Asia, Indonesia and Thailand drove the boom. Among sectors, telecommunications and power utilities were the favorites. Toll-roads in Mexico and mobile phone in India too, experienced gold rush. Private activity – as measured by investment flows to infrastructure projects with private participation- grew dramatically between 1990 and 1997 from US \$ 16 billion to US \$ 120 billion. The shift to the private provision that occurred during the 1990's was much more rapid and widespread than had been anticipated. These flows peaked in 1997. It then declined by roughly 20 percent in 1998 and further 30 percent in 1999. As the financial crises curbed the growth rate of developing economies, their demand for infrastructure fell. Latin America and East Asia were the worst sufferers. After a hiatus in new private activity, it gained momentum after 2003 but the growth was mainly driven by just one sector namely telecommunication. In all other sectors private activity remained subdued. By 2010, total investment flow is to the tune of US \$ 1,647 billion in 4772 projects. Investment in infrastructure projects with private participation has been concentrated in a few countries, but it is gradually spreading. The top ten countries accounted for 97 percent of all private activity in infrastructure sectors in 1990 but accounted for 70 percent in 1999 and further declined to 66 percent in 2010. This decrease indicates that more developing countries have started embracing private partnerships.

Fig. 2. Private Participation in Infrastructure by Region (1990-2010)



It is evident from figure 3 that the growth rate of number of projects has been 17.37 per cent while during the period 1990-2010 the PPP investment in India exponentially grew at the rate of 33.7 per cent (Figure 4). Of course in the first decade the growth was comparatively slower but in the last decade India has witnessed a quantum investment in PPP in physical infrastructure complementing the huge public efforts and expenditure especially in transport and energy sectors, which combined constitute more than three fourth of total number of projects. Amongst BRIC, Russian Federation could not revive private activity after facing a severe blow in 1993 and the investment has remained stagnant till 2010. Though, in 2006 there was a spurt in investment, it could not sustain for long. In Brazil and China, private investments have been highly volatile. These investment flows peaked in 1996-97 but unlike Brazil, investment grew impressively in China just after remaining stagnant for three years. Recent financial crisis again was a blow for investment atmosphere BRIC. So far as investment in PPI projects in India is concerned, it has gained momentum only recently and its share is about 14.21 per cent among low and middle income nations. Since 1995, the investment has flown mainly into the telecom sector capturing almost half of the total investment every year. However, the year 2009 witnessed a jump in investment in energy sector enabling the sector top the list of share of total investment in twenty years (43 per cent). It is followed by telecom sector 38.7 per cent and transport sector 18 percent. As water and sewerage attracts a meager 0.22 per cent, it seems that the major share of investments have flown mainly to the sectors where the return on investment and commercial considerations are high.

Looking at the overall development of infrastructure under PPP model, investment in energy has been the maximum followed by telecom while water has attracted meager investment (Figure 6). Energy is the leading sector in Brazil and India with largest share in investment while transport has attracted the largest share in China. In terms of investment, Russian Federation lags behind other three emerging markets, however, the largest share of total investment in the country is in the telecom sector. The potential use of PPPs in e-governance and health and education sectors remains largely untapped across emerging economies, though off-late there have been some activities shaping in these sectors. China accounts for more than half the water projects with private participation implemented in low and middle income countries in last decades. Of the total of 731 projects, China implemented 350, representing more than US \$ 9149 million in investment commitment. China's predominance in private water projects has increased in recent years; the country accounts for more than 70 percent of those established in developing countries since 2006. Private activity in road projects in developing countries has experienced a resurgence since 2005, registering an increase from US \$7 billion in 2005 to US \$16.7 billion in 2008 and further to US \$ 145 billion in 2010. The growth in investment was concentrated in a few countries. Brazil, Mexico and India realized an increase in their share of total investment rising from around 20 percent in 2005 to more than 80 percent in 2008. In all three countries new models and frameworks for private participation have helped attracting investment in road infrastructure.

Table 2: Top 10 Countries by Private Partnership in Infrastructure (1990-2010)

Country	Project Count	% of Total No. of Project	Country by Investment	Project Investment	% of Total Project Investment
China	949	19.88	Brazil	287,320	17.44
India	513	10.75	India	234,204	14.21
Brazil	485	10.16	China	112,852	6.85
Russian Fed	332	6.96	Russian Fed	103,817	6.30
Argentina	205	4.30	Mexico	103,177	6.26
Mexico	191	4.00	Argentina	84,104	5.10
Colombia	138	2.89	Turkey	61,215	3.71
Chile	121	2.54	Philippines	53,261	3.23
Philippines	108	2.26	Malaysia	53,235	3.23
Thailand	103	2.16	Indonesia	50,219	3.04

Source: Private Participation in Infrastructure (PPI) Database of the World Bank

Main modes of entry for private partnership in infrastructure include joint ventures, greenfield projects, divestiture or asset sale. Greenfield projects involve new projects usually built and operated by private sector which takes on the commercial risk. The most common forms of such projects include Build-Operate-Transfer (BOT), Build-Own-Operate (BOO), Build—Own-Operate-Transfer (BOOT) and Build-Lease-Transfer (BLT). Greenfield projects predominate in BRIC countries. Greenfield projects accounted for more than 55 percent of total investment flows and equally in the number of projects in 1990-2010. Greenfield projects are common in telecommunication sector, especially for new wireless technologies and the energy sector where non-sovereign guarantees encourage private investment in new infrastructure. A total of 60 private infrastructure projects were cancelled in BRIC over the period 1990-2010 comprising total investment commitments of US \$ 9729 million. This compares to nearly US \$ 738 billion of investment in almost 3000 projects over the same period, meaning cancelled projects represented 2 percent by number and 1.32 percent by investment. Cancellation rates are lower in Russian Federation and the highest in China (4 percent).

Table 3. Private Participation in Infrastructure in BRIC (1990-2010)

Financial Closure Year	Brazil		China		Russian Federation		India	
	Number of Projects by Primary Sector	Total Investment in Projects by Primary Sector (US\$ million)	Number of Projects by Primary Sector	Total Investment in Projects by Primary Sector (US\$ million)	Number of Projects by Primary Sector	Total Investment in Projects by Primary Sector (US\$ million)	Number of Projects by Primary Sector	Total Investment in Projects by Primary Sector (US\$ million)
1990	0	0	1	173	0	0	1	2
1991	0	0	2	2,379	4	18	1	614
1992	0	0	6	2,414	8	19	2	13
1993	1	0	17	3,369	153	54	3	1,051
1994	10	544	31	3,165	18	1,459	6	533
1995	14	1,544	15	1,447	30	553	16	1,691
1996	25	8,192	51	8,093	27	1,461	16	2,964
1997	47	24,055	70	13,220	11	3,695	12	5,202
1998	65	46,656	37	4,969	8	1,807	19	2,041
1999	19	16,854	26	7,247	4	918	21	4,012
2000	36	20,779	26	8,131	4	1,939	11	2,732
2001	27	18,120	46	2,207	4	3,055	16	4,008
2002	30	8,372	77	5,486	2	2,879	15	6,118
2003	21	6,911	81	9,396	8	4,466	27	3,572
2004	19	7,090	64	3,916	4	6,202	20	9,210
2005	22	10,207	89	9,342	7	6,250	22	8,102
2006	21	12,463	83	10,153	8	7,433	72	22,352
2007	20	18,833	103	8,595	16	19,927	56	22,472
2008	43	30,844	61	2,089	11	19,633	39	28,323
2009	47	39,125	46	6,120	1	5,953	44	37,296
2010	18	16,733	17	942	4	16,097	94	71,898
Total	485	287,320	949	112,852	332	103,817	513	234,204

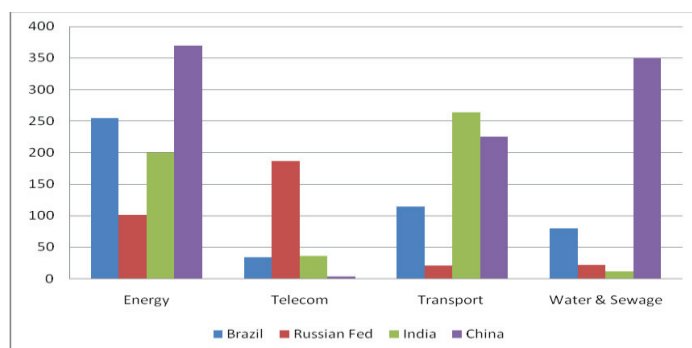


Fig 5. Number of Projects by Primary Sector (1990 – 2010)

4. Concluding remarks

As the development of world class infrastructure in tune with the growing needs and also for strengthening and supplementing the existing infrastructure facilities is a herculean task for government alone especially due to fiscal constraints and other liabilities, Public Private Partnership (PPP) model has emerged and is likely to be encouraged as a preferred mode of funding infrastructure. For emerging economies, radical structural reforms and restructuring the economy have been the catalysts to embark on the high growth trajectory. One prong of this new strategy involves attracting private partnership in

infrastructure. PPPs have provided a principal vehicle for foreign direct investment into public utilities and infrastructure in emerging economies. BRIC have been engaged in PPPs in infrastructure since 1990.

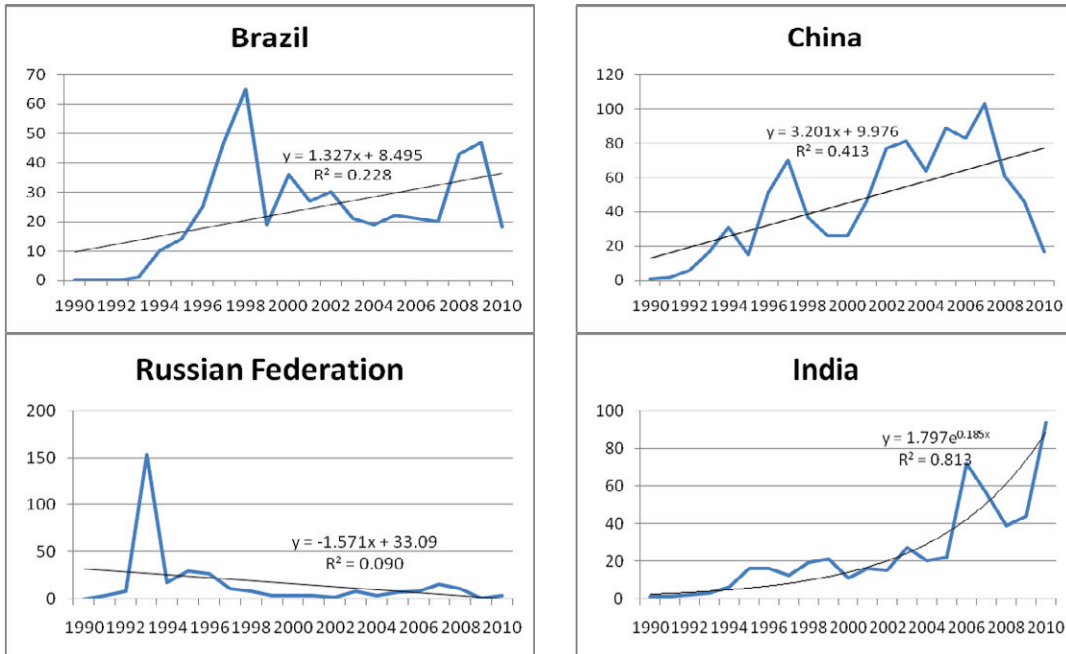


Fig. 3. Number of Projects with Private Participation in Infrastructure

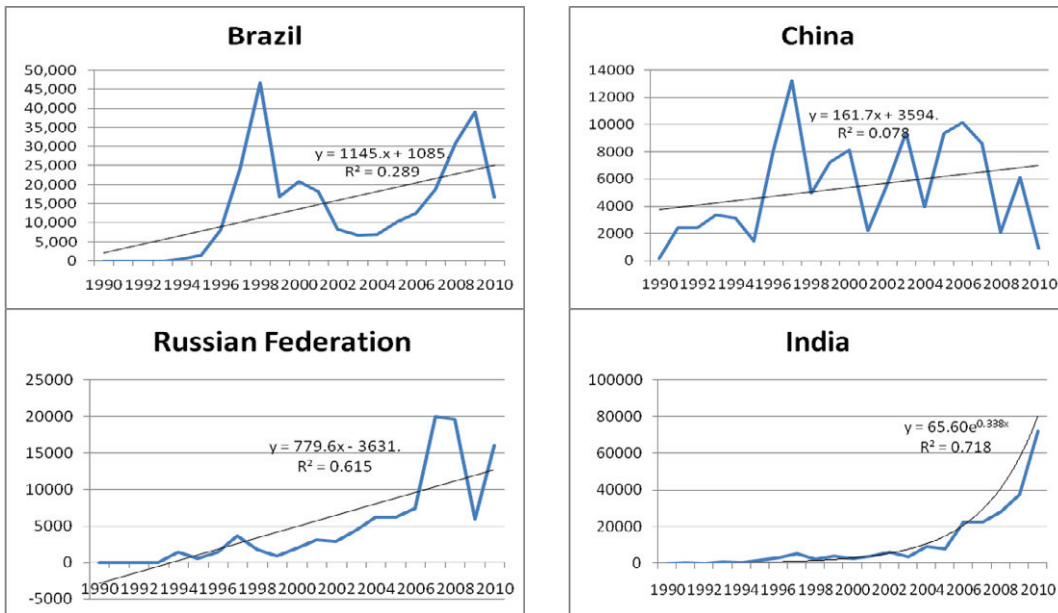


Fig.4. Total Private Investment (US Million \$)

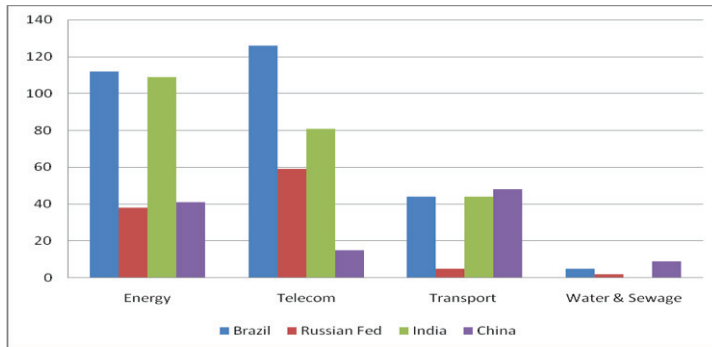


Fig. 6: Investment in Projects by Primary Sector (US \$ million)

There is no denying the fact that private investment has contributed significantly to infrastructure development over the period- far in excess of what governments could have financed on its own. However, it has been concentrated in less risky subsectors, reflecting a lower appetite for risk among private investors. Greater selectivity has facilitated private sector's renewed interest, but it also raises questions about how governments can best tap private operators' abilities in high need, high risk areas such as water and electricity distribution. Recent projects in these areas indicate that the public sector-together with the international financial institutions- remains the main source of funding. As governments create environment to attract private participation, they also need to ensure an equitable distribution of benefits among investors, taxpayers and service users.

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