

Analysis of Long Run and Short Run Relationship between Myanmar's Economy and Infrastructure-Social Investment

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ABSTRACT

The main objective of this study is to find out the impact of infrastructure investment in Myanmar economy. The variables used in the studies are gross domestic product (GDP) is dependent variable and while Employment (EMP) and Capital stock (K), Infrastructure investment (INF) such as power, construction, transportation, communication and health and education used as proxy for infrastructure investment of Myanmar during the period 1988-1989 to 2012-2013. This study used Augmented Dickey-Fuller (ADF) unit root test, Bound Test and Cointegrating to long run estimation and ECM are used with ARDL model.

The development and keep of vital physical infrastructure is an important item for sustainable economic growth. So the investment into the infrastructure plays an important role to achieve the social objectives and that are contributing to the sustained economic growth. Then a major source of economic growth is the accumulation of capital. The results of infrastructure investment, employment, capital stock and economic growth have positive relationship in the long run and no positive significant relationship in the short run. The results conclude that for the period 1988-1989 to 2012-2013, infrastructure investment have positive relationships on economic growth of Myanmar.

Key words: ARDL model, Infrastructure investment, Employment, Capital stock, GDP

Introduction

For all nations, infrastructure development is an essential move to generate economic activities. For a nation's economic development, separately from the main resources such as physical resources and human resources, technological improvement, natural resources efficient institution, and infrastructure development are essential. Therefore, infrastructure provision may be regarded as "Hardware" of a nation's economic development. Infrastructure facilitates and integrates the economic activities. According to Asian Development Bank, infrastructure is divided into two parts as "soft" and "hard" infrastructure¹. "Soft" infrastructure includes education and health. "Hard" infrastructure includes power, transport, telecommunication, sanitation, etc. Infrastructure is solitary of the

¹ Asian Development Bank, Economic and Research Department, 2014 Myanmar Unlocking The Potential

mainstays of economic transformation. Maintainable economic growth often arises in an environment where there is an important infrastructure, and there is proof that it decreases inequality in a society (Cotonou & Benin, 2013).

A main foundation of economic growth is the capital accumulation. Infrastructure is the one form of capital. Infrastructure plays a vital role in attaining the main development targets of developing countries, such as industrialization, urbanization, export promotion, equitable income distribution, and sustainable economic development. Furthermore, the availability of an efficient infrastructure network can stimulate new investment in other sectors. On the other hand, either a shortage or an over-expansion of infrastructure in certain areas can raise costs and create incentives to refrain from investing. However, good infrastructure can reduce the production costs and can raise productivity but it has to expand fast enough to accommodate growth.

Infrastructure means the vital facilities and systems portion a country, city, or area, including the services and facilities obligatory for its economy to function. Infrastructure has different definitions in different dictionaries and usages. There are many types of infrastructure. The fundamental services and facilities are crucial for a country or institution. The foundation of development is the form of physical structures. For the function of organization or society, fundamental systems and services are needed. For the supporting of day- to- day economic actions, need the facilities and in a services. Economic development is based on the basic foundations. The basic public workings in a country include transportation, sanitation, schools, roads, hospitals, stations, and communication systems in a community but infrastructure is classified to the usefulness of the accordance with them. Stations, roads, dams, transportation, bridges, canals, and irrigations, etc., are called physical infrastructure. On the other hand, universities, libraries, schools, hospitals and recreation centres are called infrastructure of human capital, and infrastructure of public utilities includes power, sanitation, communication, water distribution, and solid waste collection.

According to the World Development Report (1994), similar to the ADB, infrastructure is divided into two parts². They are called economic infrastructure and social infrastructure. Social infrastructure includes hospitals, libraries, recreation centres, universities, and parks. Economic infrastructure also includes public works such as roads, dams and canal work for irrigation and drainage, and public utilities such as sanitation,

² World Bank, World Development Report,1994: Infrastructure for Development

power, telecommunication, ports, airports, water supply, etc. This investigation is shown with the framework of this definition. The word economic development used in this study refers to an increase in GDP, more employment opportunities saved and protected environment, admission to better health and education, and reduction in inequality. Economic growth is the necessary condition for effective poverty alleviation as it can advance the standard of living of the population and promote infrastructure development. Firstly, economic growth increases the average income of households. The improvement of social and physical infrastructure through increase in state investment for education, health care and infrastructure development can lead to an indirect effect (not connected to income) on poverty reduction.

There are two positive outcomes of infrastructure on economic growth. First of all, the productivity of physical and human capital should be increased by the availability of infrastructure. For example, improving health and education sectors make easy access to both better and information and can get more capable factor combination for production. Secondly, infrastructure also serves as a direct factor input, e.g., roads are used as a necessary input in commodity market for trading from one place to another. Nevertheless, in the short run, an increase in the public capital stock in infrastructure may have an adverse effect on economic activity to the extent that it displaces (or crowds out) private investment. Furthermore, high quality infrastructure leads to incentives for new investment by decreasing costs of production. The adequate infrastructure supports determine one country's success and the other country is failure in diversifying production growth, poverty elimination, or improving environmental conditions. Good infrastructure can raise productivity and can lower production costs but it has to expand fast enough to accommodate growth. The precise linkages between infrastructure and development are still open to debate. Nonetheless, infrastructure capacity grows step by step with economic output. That is a 1 % increase in the stock of infrastructure is associated with a 1 % increase in gross domestic product (GDP) across all countries. And as countries develop, infrastructure must adapt to support changing patterns of demand as the shares of power, roads, and telecommunications in the total stock of infrastructure increase relative to those of such basic services as water and irrigation.

In Myanmar, small infrastructure investment prolonged over some decades has led to a weakening of capital stock and basic infrastructure. Public infrastructure of Myanmar investments are needed in human asset and social development particularly in health and education infrastructure and transport and communication infrastructure. Human capital

development should be considered part of the basis for the country's long-term growth. Infrastructure investment is an essential mechanism employed by the governments of developing countries over the past forty years to affect economic development (Krueger 1992). The government in most developing countries does not have the necessary organizations to instrument many fiscal policies to enable economic growth and affect income distribution; infrastructure policy is often seen as an effective method to achieve those ends (van de Walle and Nead, 1995; Israel, 1992; Broadway and Marchand, 1995). This one is widely recognized that an adequate source of infrastructure facilities is an essential component for production and growth. Infrastructure is a modest vital service that has to be put in place to support development. Socio-economic development can be facilitated and enhanced by social and economic infrastructures. If these services and facilities are not in habitation, development willpower be very difficult and actually can be likened to a very rare commodity that can only be safe at a very great price and cost. In addition, the availability of an effective infrastructure system can encourage new investment in more sectors.

On the other hand, the absence of infrastructure or over-expansion in certain areas can increase costs and make disincentives to invest. The key message of the WB Report (1994) stayed that infrastructure can provide the main benefit in economic growth, poverty alleviation, and environmental sustainability-but only when it affords services that respond to active demand and does so efficiently.

Before 1988, Myanmar's economy needed infrastructure, and infrastructure development plans were far behind schedule owing to insurgency and uncertain conditions. Meanwhile in 1989, Myanmar government invested in various sectors in order to establish Myanmar as a peaceful, modern, and developed nation. The administration of Myanmar trusts that the geographical and communication aspects show an important role in the development of physical and economic relationships between regions. So, the government has distributed furthestmost of its budget for infrastructure progress.

Myanmar has recognized the prominence of infrastructure and has made substantial progress in developing transportation, communication, and energy infrastructure even though the heavy capital investments are needed to develop since the economy of the opened up in 1989. The development of infrastructure was carried out by the national economic growth to achieve a balanced and equal growth between regions and to achieve the

solidarity of the national races. Highways known as Union Highways and National Highways have been the rivers; Ayeyarwaddy, Chindwin, and Thanlwin are implementation tasks. They are also careful as part of the boundary area development to the gap between the regions to build more confidence and accepting among the nationalities (Kyu, 2008).

According to the WBR (2013), the growth of real GDP in Myanmar is estimated at 6.5 % in 2012-2013 from 5.9 % in 2011-2012. But this event was caused by the gas production, construction, services, as well as foreign direct investment and export of commodities. According to an ADB report (2014), transport infrastructure of Myanmar gaps behind most of its peers in the state. Similarly, the power sector has the lowest rate in Myanmar compared with Southeast Asian. Needs for infrastructure investment of Myanmar is estimated to be around US \$ 22 billion for the 2010-2020 period or roughly US \$ 1.9 billion per year. Investment is a major driver of economic growth. However, Myanmar's education and health structure has suffered from long underinvestment. The investment of public was less than 1% of GDP before 2011. This situation is very low compared with ASEAN countries. However, education and health reform was started in early 2012. Therefore, the government of Myanmar started to upgrade the health and education sectors. Health outlay upturned to 1.5% of GDP in 2012 from 0.2% in 2011, while the spending of education raised to 1.6% of GDP in 2012 from compared with 0.8% in 2011.

As the government of Myanmar has built the amount of infrastructures which form the necessary foundation for the economic development of nation, there is a need for analysing the special effects of bulk investment in infrastructure provision, examining the strengths and weaknesses of these investments, and expressing appropriate policies and reforms to achieve of international standards. The objective of the study is to determine the relative importance of infrastructure in enabling Myanmar to reach its potential output level. Additionally, this study examines whether the infrastructure can be substituted for capital and labour in the production process.

Method of Study

The research method used Time series data and ARDL Model to test the analysis of Long Run and Short Run relationship between Myanmar's Economy and Infrastructure-Social Investment in this paper. And the variables, which GDP, employment, capital stock and infrastructure investment are collected from Central Statistical Organization (CSO), Asian Development Bank ((ADB), World Bank and Financial, Economic and Social

Condition published by Ministry of National Planning. This paper analyses the period of 1988-1989 to 2012-2013 of Myanmar.

Table 1 Infrastructure Investment in Myanmar (1988-1989 to 2012-2013)

(in current prices) (Kyats in Millions)

Year	GDP (Kyats)	Real GDP (Kyats)	INF stock (Kyats)	EMP (person)	K stock (Kyats)
1988-1989	76242.7	47141	132801.3	16036	386354.6
1989-1990	124666.3	48883.1	135975.6	15221	377565.3
1990-1991	151941.4	50259	147011.63	15737	383601.8
1991-1992	186902.4	49933.3	144928.13	16007	387576.1
1992-1993	249394.7	54756.6	154101	16469	392437.3
1993-1994	360320.7	58063.9	159971.6	16820	396371.3
1994-1995	472773.7	62406.1	168527.9	17230	405659.9
1995-1996	604729.1	66741.6	174260.6	17587	428148.8
1996-1997	791930.0	71042	178101.6	17964	453365.8
1997-1998	1119509.0	75123	182456.1	18359	471219.8
1998-1999	1609776.0	79460	194539.9	19069	499998
1999-2000	2190320.0	88157	203361.1	19425	528325.5
2000-2001	2552732.5	100274.8	217935	19781	569116
2001-2002	35484722	111650	220439.5	20137	610372.4
2002-2003	5625254.7	125076.5	231085.4	20493	628162.6
2003-2004	7716616.2	142387.7	234661.1	21522	646844.9
2004-2005	9078928.5	216758.47	237342.8	25829	657932
2005-2006	12286765.4	283150.86	246474.4	26132	663063.4
2006-2007	16852757.8	325915.37	253597	26435	679281.9
2007-2008	23331693.2	371973.94	259152.6	26720	713812.8
2008-2009	29233288.0	37694.11	263486	27054	759416.7
2009-2010	339056656	384784.44	269500.9	27373	823498.4
2010-2011	39776764.9	430391.31	274252.7	27740	915780.5
2011-2012	46307887.7	463078.88	278006.6	28163	929256.1
2012-2013	51259260.0	464915.51	280972.2	28571	944787.7

Source: Ministry of National Planning and Economic Development, Myanmar

Note- Infrastructure = power+ transportation +communication +construction +health+ education

Finding

The economy of Myanmar had been growing at rationally enviable rates even before then. On average, it grew at 5.1 percent between 2005/06 and 2009/10 and could have been higher if not for the devastation caused by cyclone Nargis in 2008 when growth slowed down to 3.6 percent. However, since the transition started, the economy has grown at an average of 6.7 percent. Reforms so far and reengagement with the international community have stimulated growth, and most economic and some social indicators have generally improved. In 2013, the economy grew an estimated 7.5% from 5.3% in 2010, led by increased gas production and exports, services, construction, and foreign direct investment (FDI) (Department, 2014). Myanmar's real growth rate is 4.5 percent in 2005-2006. In 2006-2007, Myanmar's real growth rate grows up 7.0 percent and 5.5 percent in 2007-2008. However, 2008-2009 economic growth rates fall to 3.6 percent because Myanmar suffered the massive destruction caused by hurricane Nargis. And then, Myanmar's annual real GDP growth rates grow up 5.1, 5.3, 5.9, and 7.3 percent in the fiscal year 2010 to 2013³. However, continued strong real GDP growth is caused by construction, gas production and services as well as foreign direct investment and exports of commodities.

Figure 1 shows some propositions for the relationship between GDP and infrastructure stock, employment, and Myanmar capital stock. Now, it can be seen that both GDP and infrastructure investment has nearly the same trend. In fact, still from 2007-2008, both GDP and infrastructure investment showed a slow growth trend. Nevertheless, FY 2008-2009 GDP fell and infrastructure investment showed a moderate growth trend.

Cyclone Nargis is believed to be the worst recorded natural disaster in Myanmar's history. Cyclone Nargis blew heavily in 2008-2009, and because of Cyclone Nargis there were lots of damages such as building, housing, and business. As a result, real GDP fell. In this figure, it can be discussed that to some extent, there is a connection between infrastructure investment and the economic growth of Myanmar.

This study examines the relationship between infrastructure investment and economic growth of Myanmar. Consequently, in order to investigate the dynamic relationship between infrastructure investment and economic growth of Myanmar during the period 1988-1989 to 2012-2013, the study of method used for estimation is based on Autoregressive Distributed Lag (ARDL) Model. The entire methodology portion consists of ADF unit root

³ World Bank, 2004, Myanmar Ending Poverty and boosting shared prosperity in a time of transition

tests, ECM estimation, and bound test in association with ARDL model. The case of Myanmar, most of the studies have been prepared only in descriptive statistics and qualitative analysis. This paper can be said to be the first to study the relationship between infrastructure investment and economic growth with numerical analysis. Descriptive analysis of the infrastructure investment of Myanmar is also done as part of the empirical investigation.

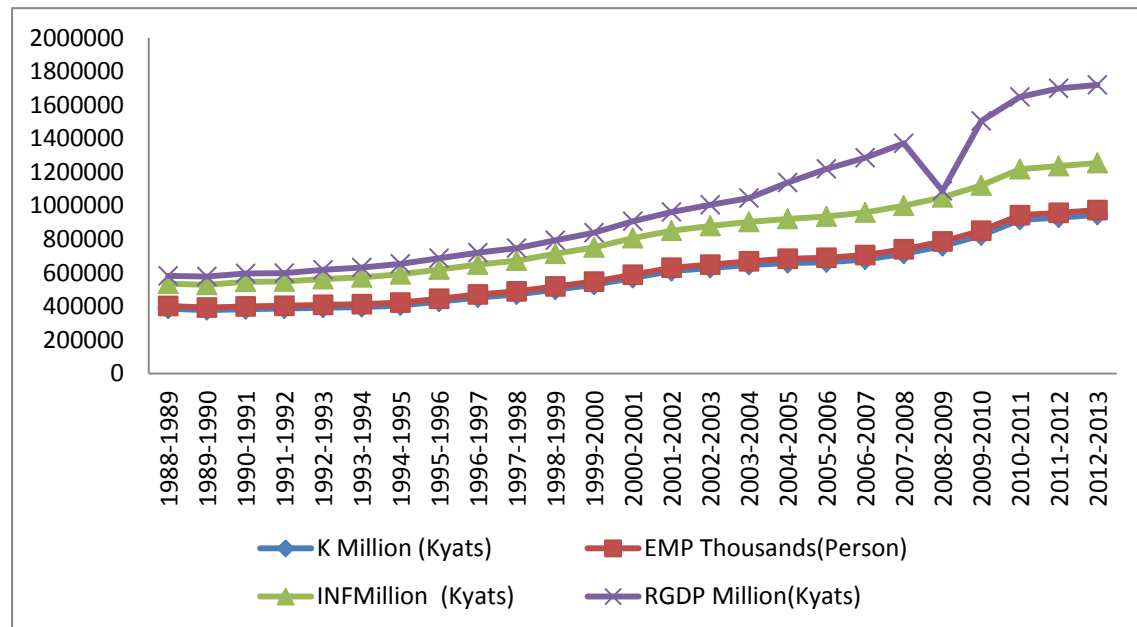


Figure 1 RGDP, infrastructure Stock, employment and capital stock during 1988-1989 to 2012-2013

In this research, three methods such as ADF unit root test, Bound test and Cointegration and long run estimation, ECM are used. The results are as follow:

Table 2 Augmented Dickey-Fuller unit root tests results

Variables	ADF Test statistics	5% Critical value	10% Critical value	Deterministic Regressors	Lags	Results
lnGDP	-4.380527 (0.0030)	-3.020686	-2.650413	Intercept	5	Stationary
lnINF	-5.927624 (0.0001)	-2.998064	-2.638752	Intercept	5	Stationary
lnEMP	-4.777279 (0.0010)	-2.998064	-2.638752	Intercept	5	Stationary
lnK	-2.981671 (0.0517)	-2.998064	-2.638752	Intercept	5	Stationary

Source: Calculation () = P-Value

According to ADF unit root test all independent variables, i.e. INF, EMP and K in Table 4.1 are of I(1) and dependent variable of GDP is also stationary at first different I(1) in testing with intercept. Therefore, by testing with intercept, null hypothesis cannot be rejected for all time-series that is they are stationary. And so, the appropriate technique to cointegration is the ARDL approach to cointegration by using Bound test.

Table 3 ARDL Approach to Cointegration: Results of F-Test

Variables	F-Test	Lag Length	The number of k
$\Delta \ln GDP \{F_{GDP}(\ln GDP \setminus \ln INF, \ln EMP, \ln K)\}$	31.62044	4	3

Source: Calculation (3.65-4.66, 3.15-4.08, 2.79-3.67 and 2.37-3.2 are the lower and upper critical values for bounds testing ARDL for 1%, 2.5%, 5% and 10% significance levels, respectively.)

In table 3 shows the calculated F-statistics. The value of F- statistics was tested to know the existence of a LR relationship among variables of Myanmar economy and Infrastructure-economic investment. From table 4.4 mentioned the cointegration among the economic growth; INF, EMP and K in Model 1 exist when economic growth is the dependent variable because it is at 4 lag length F-value that is higher than the lower bound and upper bound value. The null hypothesis of no cointegration among economic growth, INF, EMP and K is also rejected and that there is indeed a cointegration relationship among the variables in the model.

Table 4 Results of the LR coefficients using ARDL (4, 4, 4, 4) (Dependent Variable is LNGDP from 1988-1989 to 2012-2013)

Regressor	Coefficient	T-Ratio (Prob.)	ARDL Model
LNINF	0.037257	0.03905(0.97)	ARDL(4,4,4,4)
LNEMP	0.418018	0.385421(0.76)	ARDL(4,4,4,4)
LNK	1.773549	2.100864(0.28)	ARDL(4,4,4,4)
Constant	-16.240010	-5.358060(0.11)	ARDL(4,4,4,4)

Source: Calculation

From Table 4, the coefficient of infrastructure stock, employment and capital stock are positive and statistically significant, indicating that infrastructure investment; employment and capital stock enhance economic growth in the LR. If an increase in infrastructure investment about 1 percent, GDP will increase on average, about 3 percent at 5% significant level in LR. This is consistent with the findings of Peter Perkins, Johannfedderje and Johnliz(2005), James Heintz, Robert Pollin, Heidi Garrett-Peltier (2009), Wolassa L. Kumo(2012) and Sakineh Sojoodi, Fakhri Mohseni Zonuzi and Nasim Mehin Aslani Nia(2012).

Conclusion

The main objective of this study is to examine and find out the relationship between infrastructure investment and economic growth of Myanmar over the period of 1988-1989 to 2012-2013 mainly with the empirical analysis and general descriptive statistics. The data set engaged in this study is secondary data of annual Gross Domestic Product (GDP), infrastructure investment (INF), employment (EMP) and capital stock (K) of Myanmar during the period 1988-1989 to 2012-2013.

This study accepts two main methodological approaches in order to find out the appropriate answers to the research problem. Firstly, econometric methods such as Augmented Dickey-Fuller unit root test, Bound test and cointegration to LR estimation within the framework of (ARDL) model. Empirical results remain principally based on the above econometric methods. Secondly,

The results of this study are the same to conventional acceptance that infrastructure investment has significant impact on the economic growth of Myanmar. The empirical results of this study shows that there is significant positive relationship between infrastructure investment and economic growth meaning that infrastructure investment can be generated a significant effect to enhance economic growth. The same results ha Robert Pollin, Heidi Garrett-Peltier (2009), Sakineh Sojoodi, Fakhri Mohseni Zonuzi and Nasim Mehin Aslani (2012). Therefore, we have to accept the first hypothesis that infrastructure investment had an impact of economic growth of Myanmar the period of 1988-1989 to 2012-2013.

The results from this research are that during periods of economic growth, investment through public infrastructure motivates economic growth by growing national income. So, the government of Myanmar had raised infrastructure investment in order to not only decrease unemployment problem but also to encourage regional development using

fiscal policies and domestic resources. Moreover, most of industry zone cannot reach expected investment from both foreign and domestic owing to insufficient infrastructure investment. If better transportation and communication, employment can easily be access to find jobs through information, education and more appropriate job opportunities and thus promoting then if increase labour production. Furthermore, better transportation and communication enable entrance to markets, improving and also the agriculture sector and modernization of trade.

Suggestion for Future Study

This study examines the relationship between infrastructure investment and economic growth of Myanmar in general. Data set used for the practical analysis is the real GDP and infrastructure investment, employment, and capital stock. Infrastructure investment includes health and education such as social infrastructure and power, construction, and transport and communication such as economic infrastructure investment. However, as basic infrastructure plays a vital role in Myanmar's infrastructure investment sector, future researchers may study by dividing the economic and social infrastructure into two and study the impact of both investments on the economic growth of Myanmar.

Additionally, the rest of basic infrastructure investment could also be put into the model so that the whole investment sector of Myanmar can be covered in one research.

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