



# An Analysis of Public Infrastructure Investment and the Thai Economy

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**Abstract.** The main objective of this paper is to investigate the impact of the policies of heavy investment and expansion in public infrastructure deployed by the Thai government on Thai economic growth and government debt between 1997 and 2007. It employs the method of detrending the Thai economic data and analyzing the correlation between the Thai GDP, gross fixed capital formation, and central government debt. The findings showed that the public infrastructure investment and expansion were generally positive and beneficial to Thai economic growth, and did not lead Thailand to the massive build-up of government debt, because the development in the economy improved the government's financial situation. These results imply that policies for improving public infrastructure investment and expansion should be promoted to further develop the economy and achieve stable growth.

**Keywords:** Infrastructure · Investment · Economic growth · Government debt · Thailand

## 1 Introduction

During the 1997 Asian Financial Crisis, Thailand's economy suffered a major blow, with a GDP growth rate of -2.8% in 1997 and -7.6% in 1998, ending over forty years of fast-growing. On 9 February 2001, Thaksin Shinawatra became Prime Minister of Thailand, introducing a series of ambitious economic policies which was referred to as "Thaksinomics", to further recover Thailand from the financial crisis and achieve stronger economic performance. One of the most important policies of Thaksinomics was the heavy government investment in public infrastructure, with over \$50 billion invested in expanding roads, railways, public transit, and a new international airport, which is now the Suvarnabhumi Airport of Bangkok [1]. Overall, Thaksinomics was seen as successful with GDP growth of 5.3% in 2002, 7.1% in 2003, and 6.3% in 2004 despite rising oil prices, according to World Bank data.

However, these policies of infrastructure investment attract criticism for causing the expansion in government debt and economic vulnerability in the future. The main

purpose of this study is, therefore, to gain an understanding of the impact on the Thai economy of Thaksin's economic policy of heavy investments in public infrastructure via analyzing Thailand's economic and financial data from 1997 to 2007.

## 2 Literature Review

As one of the important parts of the Keynesian fiscal stimulus policies, mega-infrastructure-projects pushed by the government have always been one of the major measures for the government to recover from economic crises since the Great Depression and the New Deal Era, being considered as a way to reduce unemployment and further stimulate the economic vitality in the long run. One of the recent examples is the 2008 Chinese economic stimulus plan, an RMB 4 trillion stimulus package with the aim of minimizing the impact of the 2008 Financial Crisis. The plan included heavy investment and expansion of the public infrastructure, notably the high-speed railway, which has played as a major catalyst for the Chinese economy in the future. The plan proved successful as China's GDP growth rate reversed the downturn during 4Q 2008 and rose over 10% again in Q3 2009.

Many previous studies with reliable methods and solid proof show that public infrastructure investment stimulates the economy and has significant and positive effects on economic outputs and growth [2, 3]. And invest in infrastructure to stimulate the economy has been adopted by most of the countries in the world. However, although the positive effects are widely recognized, some researchers suggested that over-expansion and heavy investment could lead to a series of economic problems. A study on China indicates that debt-financed overinvesting in the public infrastructure resulted may result in the build-up of debt and economic fragility [4]. Another study on South Africa suggested that infrastructure projects need to be developed at the right place and at the right time in order to positively stimulate the economy [5]. Furthermore, research on the infrastructure development and external debt of African countries implies that the build-up of external debt during infrastructure development may have negative results, and African policymakers need to improve infrastructure while assuring the debt stays at a sustainable level [6]. Overall, the impact of infrastructure expansion and investment on national economic development and government debt is still an issue in dispute, without a universally acknowledged conclusion.

## 3 Methodology

Two estimation and calculation methods are applied in this study: detrending and correlation.

Due to the fact that GDP is a time series data that take different values at different times and points indexed in time order, thus detrending is applied to this study. Detrending can systematically remove the trend of each order in the sequence and is applicable to the study of various non-stationary time series. In this study, the trend component, cyclical component, and the difference between GDP and its trend are included. We first create a linear trend line and get the data of the trend, then minus original data and the trend data to get their difference. After that, use the trend line equation in Excel:  $\frac{GDP - Trend}{Trend} * 100\%$

to get the value of the cyclical component, which is the fluctuations detected in the time series data around the trend.

Second is the correlation, it reflects the degree to which two datasets move in coordination with one another and the value lies in the range of  $[-1, 1]$ . If the absolute value of the correlation between two groups of data is high, it indicates that they are strongly correlated, otherwise, they are weakly correlated. If the correlation is close to 1, it means that they are positively correlated, that is, they fluctuate in the same direction; If the correlation is close to  $-1$ , it means that they are negatively correlated, that is, reverse change.

The argumentation idea of our paper is: first measure the correlation between infrastructure investment and GDP, then measure the correlation between infrastructure investment and debt, and finally study the correlation between debt and GDP.

Based on the above analysis, our guess is that the correlation between infrastructure investment and GDP is positive and close to 1, while the correlation between infrastructure investment and debt, debt and GDP are both negative and slightly close to  $-1$ , which means that if the infrastructure investment increases, then GDP will also grow positively in the same direction; If the capital construction investment increases, the debt will reduce to a certain extent; Finally, if debt reduces, GDP will grow in a positive reverse direction.

## 4 Data

The sample contains three indices: the gross domestic product (GDP), the gross fixed capital formation, and the central government debt from Thailand. The investment in gross fixed capital is expressed in monetary form. It refers to the workload of enterprises to build and purchase fixed assets in a certain period of time and the changes in costs related thereto, including real estate, buildings, machines, machinery, means of transport, and investment in capital construction, renovation, overhaul, and other fixed assets of enterprises. We use this data to roughly express the infrastructure investment because the investment in fixed assets includes real estate, buildings, machinery, machinery, transportation tools, etc., which is mainly the same as that in infrastructure investment projects. Government debt refers to the government debt formed by bonds issued by the government in domestic and abroad or loans from foreign governments and banks.

The data covers the 1997–2007 period, which is the recovery period after the Asian Financial Crisis, and derives from the International Financial Statistics and the World Bank. The currency unit of these data is the Thai baht, and the scale unit is millions. The reasons for choosing this study period and the three indices are to analyze the impact of infrastructure investment on GDP and national debt after the Asian Financial Crisis, and also to prove the view that “the debt-financed overinvesting in the public infrastructure resulted may result in the build-up of debt and economy fragility.” is not absolutely correct [4]. However, it also needs to be pointed out that another reason why this paper chooses the 1997–2007 period is that it was a decade with a relatively stable global economic environment, providing a fairly stable and persistent data series. While after the 2008 Financial Crisis, the Thai economy suffered a major blow, adding numerous unpredictable factors and variables and making it hard to analyze the impacts respectively. All the calculations and diagrams are made using Excel software.

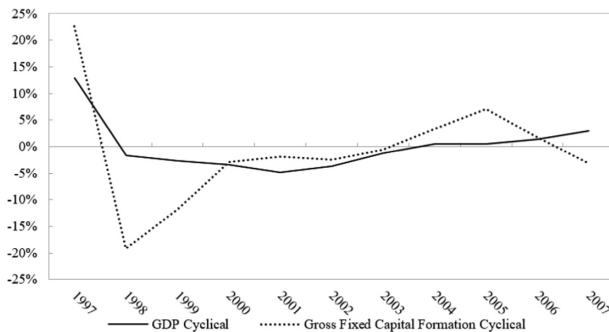
## 5 Result and Discussion

Table 1 shows the cyclical of Thai GDP, Gross Fixed Capital Formation, and Central Government Debt. Table 2 shows the Correlation between Thai GDP, Gross Fixed Capital Formation, and Central Government Debt. Figure 1 shows the Co-movement of Thai GDP and Fixed Capital Formation Cyclical Components from 1997 to 2007. The GDP and gross fixed capital formation correlation are 0.74, which indicates that there was a positive relation between the Thai GDP and gross fixed capital formation. This result suggests that the development and expansion of the national infrastructure, which are major parts of the gross fixed capital formation, contribute positively to the Thai GDP. This positive impact on economic growth helped Thailand greatly in the further recovery from the Asian Financial Crisis.

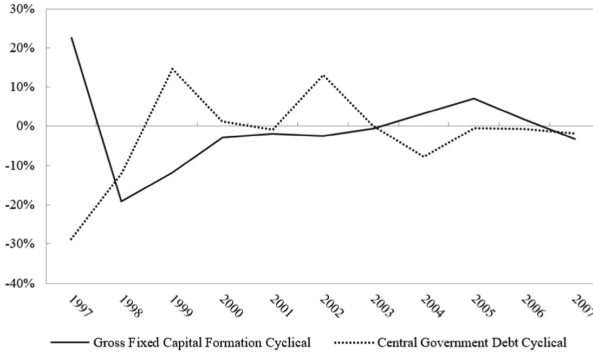
**Table 1.** Cyclical Components of Thai GDP, Gross Fixed Capital Formation, and Central Government Debt

Year	GDP Cyclical	Gross Fixed Capital Formation	Central Government Debt
1997	12.82%	22.59%	-28.82%
1998	-1.64%	-19.22%	-11.91%
1999	-2.61%	-11.91%	14.55%
2000	-3.41%	-2.96%	1.21%
2001	-4.89%	-1.85%	-0.91%
2002	-3.67%	-2.45%	13.05%
2003	-1.27%	-0.63%	0.04%
2004	0.53%	3.28%	-7.82%
2005	0.52%	7.11%	-0.44%
2006	1.42%	1.64%	-0.64%
2007	2.95%	-3.20%	-1.78%

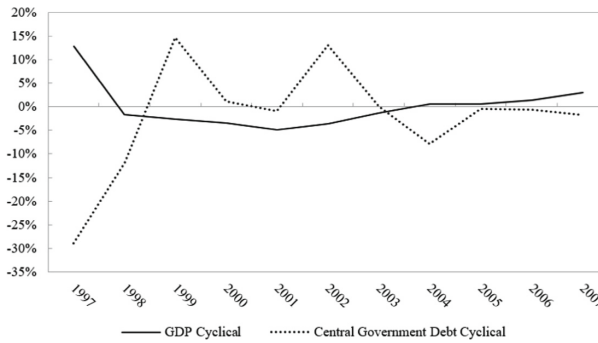
Source: World Bank IFS and author's own calculation



**Fig. 1.** Co-movement of Thailand GDP and Fixed Capital Formation Cyclical Components (1997–2007). Source: World Bank IFS



**Fig. 2.** Co-movement of Thailand Fixed Capital Formation and Central Government Debt Cyclical Components (1997–2007). Source: World Bank IFS



**Fig. 3.** Co-movement of Thailand GDP and Central Government Debt Cyclical Components (1997–2007). Source: World Bank IFS

**Table 2.** Correlation between Thai GDP, Gross Fixed Capital Formation, and Central Government Debt

<i>Components</i>	<i>Correlation</i>
GDP & Gross Fixed Capital Formation	0.74336
GDP & Central Government Debt	-0.78185
Gross Fixed Capital Formation & Central Government Debt	-0.54286

Source: World Bank IFS and author’s own calculation

Infrastructure investment contributes to Thai economic growth, but is it also causing the build-up of the national debt? Figure 2 shows the Co-movement of Fixed Capital Formation and Central Government Debt Cyclical Components from 1997 to 2007. The analysis result is that the correlation between these two components is only -0.54, this means that there is somewhat low negative relevance between the infrastructure expansion and the increase in debt.

However, Figure 3 shows the Co-movement of Thai GDP and Central Government Debt Cyclical Components, and the correlation is -0.78, which suggests that there is a highly negative correlation between economic development and national debt in Thailand. This result means that the national debt was better controlled at an acceptable and sustainable level as the GDP grew.

Combined with early results, we conclude that, in Thailand, from 1997 to 2007 the government investment and development in national public infrastructure contributed positively to economic growth. And with the improved national economy and living quality brought by the infrastructure development, the financial condition of the central government was bettered simultaneously, which led to the better handling of its debt. In return, less debt and improved financial condition helped in achieving a stable and sustainable economy, creating a virtuous circle, which was what Thailand witnessed under the Thaksinomics.

## 6 Conclusion

Overall, the policies of heavily investing in public infrastructure in the Thaksinomics were positive and beneficial to the Thai economy, especially playing a major role in further recovery from the Asian Financial Crisis and establishing a stable economy. Indeed, the infrastructure expansion resulted in an increase in government expenditure, however, in Thailand this increase in expenditure didn't lead to a massive build-up of the national debt, as the development of infrastructure stimulated economic growth, resulting in the improvement of the government's financial situation and reduction in national debt. To conclude, from 1997 to 2007, the investment in infrastructure contributed positively to the Thai economy and Thaksinomics was generally a success with the strong economic performance.

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