

# **Private Sector Investment in Sierra Leone: An Analysis of the Macroeconomic Determinants**

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# Abstract

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Many developing countries experienced a downturn in economic growth in the early 1980s. In Africa, the growth rate of income per capita fell significantly following persistent decline in domestic investment. For Sierra Leone, private investment as a share of GDP declined steadily from 6.9% in 1986 to around 3.1% in 1988. This trend further deteriorated to a record low of about 2.4% in 1993. This study principally aims at evaluating the macroeconomic determinants of private investment in Sierra Leone using times series data for the period 1966 to 2008. In order to account for factors that best capture the behaviour of private investment decisions in Sierra Leone, a more flexible version of the accelerator principle was adopted in specifying an investment equation for the study. To empirically determine the relationships between private sector investment and some key macroeconomic variables, the study employs Ordinary Least Square estimation following an examination of the time series properties of the data set using unit root tests. The results from the unit root tests for stationarity show that all the variables are stationary with breaks, justifying the use of an Ordinary Least Square estimation approach. The empirical findings from this study show that, while private sector investment is positively driven by real GDP, public sector investment, and credit availability to the private sector, it is, however, negatively driven by the real interest rate, inflation, and political instability, characterized by a decade-long civil conflict.

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# 1. Introduction

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Many developing countries experienced a downturn in economic growth in the early 1980s. The average growth rate of real GDP among developing countries fell from 0.4% per annum during the 1973-1980 period to -1.2% per annum during the 1980-1989 period (Oshikoya, 1994). Africa continued to fare poorly in the 1990s, during which GDP per capita declined by around 1.8% per annum, while other developing countries recorded a growth in per capita GDP of around 4.4% (World Bank, 1996). The reasons for such an acute economic downturn can be explained by both external and internal factors. The significant decline in gross investment rates may, perhaps, reflect many factors that affected most developing countries during the 1980s. On average, the ratio of total domestic investment to GDP fell from approximately 20.8% per annum in 1973-1980 to 1.1% per annum in 1980-1989. Though this rate has not been uniform across countries, investment has fallen by around 10% of GDP in some countries.

Private sector investment in Sierra Leone has shown a declining trend since the 1980s, falling steadily as a share of GDP from an annual average of 7.3% during the period 1981-1990 to a record low of around 3.1% between 1991 and 2000. The adoption of a stringent monetary policy stance following the implementation of the Economic Emergency Act in 1987, coupled with the outbreak of civil conflict in early 1991, partly accounted for the deteriorating trend in private sector investment. As a consequence, the GDP growth rate declined over the period, resulting in a severe decline in per capita income between the mid 1980s and the latter part of the 1990s. GDP per capita plummeted from an average of US\$ 280 in 1971-1980 to an average of around US\$ 184 between 1991 and 2000 (a decline of about 34%). The country, thus, continued to rank near the bottom on most social indicators, especially in the 1990s. According to the World Bank (1997), average life expectancy stood at around 39 years, while infant and maternal mortality rates were claimed to be among the highest in the world. The literacy level was low, as adult illiteracy stood at around 80%. The lack of broad-based human capital development thwarted growth in formal-sector employment, thereby leading to a severe earnings limitation for many Sierra Leoneans.

## 1.1 Statement of the Research Problem

Sierra Leone's experience with industrialization has been similar to that of other developing countries. After attaining independence in 1961, the government embarked on an import substitution strategy in which policies were designed to encourage the expansion of large-scale urban-based and foreign-owned firms. The legal framework regulating the activities and procedures pertaining to the private sector was enhanced to provide incentives for private sector repatriation, and remittance of dividends and interest were guaranteed to foreign investors under the Foreign Investment Protection Act (FIPA). In 1993, the government established the Sierra Leone Export Development and Investment Corporation (SLEDIC) with the aim of expanding the operations of export-oriented manufacturing and processing industries. Several other investment codes were established, including the Income Tax Amendment Act 1994, the Fisheries Management and Development Decree 1994, and the Mines and Mineral Decree 1998. The country also entered into bilateral investment promotion and protection agreements with a number of countries in an effort to provide further protection to foreign nationals wishing to invest in Sierra Leone. Furthermore, Sierra Leone established membership with the Multilateral Investment Guarantee Agency (MIGA) of the World Bank, which provides non-commercial risk coverage for foreign investors in developing countries. The ongoing divestiture programme of the government under the Public Enterprise Reform and Divestiture Commission (PERDIC) underscores Sierra Leone's commitment to private sector participation in economic activities.

Despite efforts by the government to ensure sustainable growth through private sector investment, experience has been disappointing. On account of domestic and international factors, the overall performance of the real sector has continued to be generally unsatisfactory. According to the revised estimates of the Sierra Leone Statistics Office (Statistics Sierra Leone), GDP at factor cost declined by 1.7% between 1992 and 1993. In the mining sector, diamond and gold mines continued to face acute problems of smuggling, while bauxite, rutile and ilmenite suffered from lack of external demand. Between 1993 and 1994, total merchandise exports registered a reduction of 15.9%. This was largely due to a drastic decline in the value of mineral exports, which constituted the largest source of revenue.

Since the mid-1980s, the country has continued to face adverse economic conditions. Consequently, GDP per capita plummeted from US\$ 340 in 1980 to a record low of US\$126 in 2000. Several factors may have accounted for this. In the first place, the real sector was depressed as hostilities continued to intensify in the mid 1990s. The rutile and bauxite mines were temporarily closed down, agricultural exports fell, and output from the manufacturing sector was disappointing.

On account of the negative consequences of the civil conflict, total exports declined by about 55%. On the contrary, total imports went up by about 19% in an effort to narrow the gap created by the poor performance of the domestic real sector. This amounted to



a widening of the trade deficit from US\$51 million in 1994/95 to US\$125 million<sup>1</sup> in the 1995/96 financial year. Consequently, the country's reserve position worsened from US\$26.2 million in 1995 to US\$17.5 million in 1996, imposing a seriously destabilizing effect on the exchange rate, and leading to a depreciation of the Leone (the domestic currency) by around 35% over the year. During this period, total fiscal deficit stood at Le51.6 billion (i.e. US\$52.6 million), accounting for about 6.1% of GDP. As opposed to the 1994/95 financial year, when only 6% of the total fiscal deficit was financed domestically, 49% of the 1995/96 deficit was financed domestically, resulting in an increase of Le2.3 billion (US\$2.34 million) in the stock of net domestic financing.

Though average bank lending rates rose steadily from 28.8% in 1995 to 32.1% in 1996, high inflationary pressure reduced the real interest rate from 25.9% in 1995 to around 23.1% in 1996. Inflation rose from 26% in 1995 to around 35.0% in 1998 ( See Bank of Sierra Leone Bulletin of 1998). Although private investment in nominal terms rose from Le21.3 billion in 1995 to Le26.5 billion in 1996, private investment as a share of GDP actually declined from 3.24% in 1995 to around 3.06% in 1996. Between 2001 and 2004<sup>2</sup>, inflation declined to an annual average of 7.6%, and thereafter rose steadily to around 10.1% and 12.8% in 2005 and 2006, respectively.

From one point of view, it is argued that high government spending financed by domestic credit is inflationary. This inflation — which is an indication of macroeconomic instability — can distort private sector investment, thus hampering growth (Fischer, 1991). Inflation can also increase capital accumulation as it increases the level of investment. This is because economic agents would like to maintain the real value of their assets. This is often referred to as the Mundell-Tobin effect. Budget deficits, when financed by domestic borrowing, will raise real interest rate (in a liberalized economy), thereby reducing private investment and deteriorating growth. In an economy with a fixed interest rate regime, savings mobilization by financial intermediaries will fall, thereby reducing the volume of credit available to the private sector. Thus, given the above arguments, the major problem of this research is to empirically establish the nexus between private sector investment and key macroeconomic variables using data from Sierra Leone.

## 1.2 Objectives of the Study

**T**his study primarily intends to ascertain the macroeconomic determinants of private sector investment in Sierra Leone using data for the period 1966-2008. Specifically, the study seeks to:

- Establish empirically the relationship between real GDP and private investment in Sierra Leone;
- Examine the relationship between public and private sector investment in Sierra Leone;

1 Bank of Sierra Leone Annual Report and Statement of Account, June 1996.

2 Immediate post-war period in Sierra Leone.

- Ascertain the impact of interest rates on private investment in Sierra Leone;
- Assess the impact of credit to the private sector on private investment in Sierra Leone;
- Determine the relationship between inflation and private sector investment in Sierra Leone; and
- Ascertain whether the ten-year civil war significantly impacted on private sector investment in Sierra Leone.

### **1.3 Statement of Hypothesis**

The following hypotheses will be tested in this study:

1. Private investment in Sierra Leone is positively related to real GDP.
2. Public sector investment boosts private investment in Sierra Leone.
3. Interest rates negatively affect the level of private investment in Sierra Leone.
4. Credit to the private sector promotes private sector investment in Sierra Leone.
5. Inflation negatively impacts on private sector investment in Sierra Leone.
6. The ten-year civil war adversely affected private sector investment in Sierra Leone.

## 2. Overview of the Sierra Leone Economy

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### 2.1 Overview

Sierra Leone is a poor, open and non-oil producing economy with an estimated population of 5.54 million (2005), a per-capita income of about US\$217.76, and a population growth rate of around 2.2% in 2005. Per capita income declined from US\$380 in 1980 to US\$155 in 2003. Agriculture constituted the largest sector of the economy in 2005, contributing approximately 45% of GDP, and providing about 75.0% of employment. Agriculture is also a significant source of foreign exchange, accounting for approximately 40% of total export earnings. The country is also rich in mineral deposits. The key minerals are diamond, bauxite, iron ore, rutile and gold. Earnings from mineral exports account for the remaining 60% of the country's foreign exchange earnings. In comparison, the manufacturing sector is rather small, constituting mainly import-substituting industries whose production accounted for about 6% of GDP and provided employment opportunities for about 2% of the total labour force.

Despite the destabilizing effects of the rebel war, which started in 1991, significant economic reforms have been undertaken since the implementation of the Economic Recovery Programme<sup>3</sup> in 1989. In 1992, the World Bank extended a Reconstruction Import Credit followed by a Structural Adjustment Credit in 1993<sup>4</sup>. Following large stabilization gains, the economy once again registered a positive growth rate in 1992. However, following the escalation of hostilities in the eastern and southern parts of the country, there was a large displacement of the rural population, a significant decline in agricultural output, and major disruption of transport links in the provinces of the country. This resulted in acute setbacks in macroeconomic stability in 1995. The considerable decline in mining activities, coupled with the displacement of persons from farming

3 This was primarily meant to correct macroeconomic imbalances as well as structural reforms.

4 Bank of Sierra Leone Report, 1997.

activities, resulted in a decline in real GDP by an estimated 10%. Transactions in the external sector were drastically downsized in the context of the low level at which the economy was operating.

Between 1966 and 1970, the GDP growth rate stood at an average of around 3.9% per annum. As a result of the adverse effects of the oil shocks of the 1970s, the GDP growth rate declined to an average of about 2.3% during the period 1970-1979. The fall in GDP growth within this period could also be attributed to the persistent decrease in revenues from the mining sector owing to smuggling, as well as the continued depletion of alluvial diamond deposits in major mining areas. The situation was further aggravated by the closure of the Marampa Iron Ore Mining Company in the early 1970s. Thus, during the period 1981-1990, the GDP growth rate fell to an annual average of about 0.98%. The situation deteriorated further in the 1990s owing to the outbreak of the civil war, which further devastated the country's economic base. Thus, between 1991 and 2000 (i.e, the war period in Sierra Leone), the GDP growth rate averaged a record low of about -4.29%.

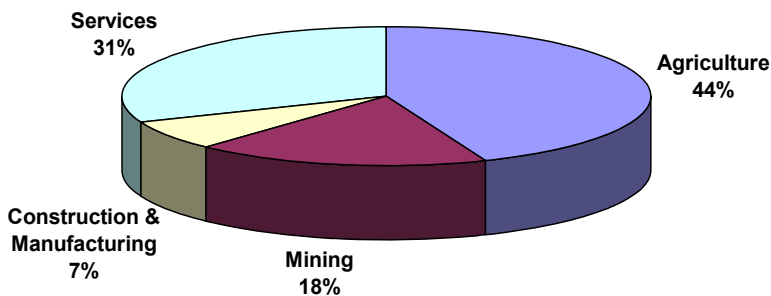
**Table 1: Selected economic and financial indicators for Sierra Leone, 1966-2008**

	1966-70	1971-80	1981-90	1991-2000	2001-2004	2005	2006	2007	2008
GDP (million US\$)	356.6	676.7	855.5	740.1	859.8	1,161.6	1,443.0	1,517.3	1,505.5
GDP growth (%)	3.87	2.32	0.98	-4.29	15.5	7.5	7.1	6.0	6.7
GDP per capita (US\$)	254	280	274	184	192	217	212	208	210
Population (millions)	2.59	2.97	3.66	4.21	5.01	5.53	5.64	5.71	5.78
Exchange rate (US\$)	0.788	0.962	30.57	1001	2,283	2,889	2,961	2,985	3,250
Private investment as a % of GDP	7.14	7.10	7.29	3.08	3.70	8.30	6.97	6.91	9.55
Public investment as a % of GDP	5.98	5.23	3.54	3.73	5.34	9.82	8.04	7.52	7.98
Inflation rate (%)	2.9	13.9	80.7	24.6	7.6	10.1	12.8	11.9	7.9
Lending interest rates (%)	8.0	9.4	23.8	35.8	22.1	24.6	23.5	24.6	24.8
Total imports (million US\$)	109.3	211.8	196.2	200.4	356.5	509.3	591.6	580.4	612.5
Total exports (million US\$)	104.9	165.7	176.8	152.1	179.7	286.6	372.0	413.2	470.1
M2 to GDP (%)	12.1	15.3	19.1	11.5	17.1	18.1	18.7	19.1	19.3
M2 to total reserves (%)	1.89	3.50	25.09	3.72	2.39	1.47	1.61	1.72	1.82
M3 to GDP (%)	12.7	16.7	22.9	12.9	19.1	20.6	20.5	20.8	20.9
Total reserves (million US\$)	27.6	39.0	9.57	33.0	81.9	170.5	183.9	203.5	234.5

**Source: Sierra Leone Historical Data (Bank of Sierra Leone)**

Sierra Leone's post-war economic recovery efforts, which began in 2000, continued uninterrupted until 2008, when gross domestic product (GDP) grew by an estimated 6.7% despite increases in food and fuel prices. Much of this growth was concentrated in the informal agricultural, fishing, mining and service sectors that make up the bulk of the economy. Formal economic activity is confined primarily to large-scale mining, construction, retail services, tourism and government employment. The main source of growth has been high post-conflict productivity growth. The contribution to growth from the labour force from 2002 to 2008 was estimated at 2.4%, while physical capital contributed another 1.6% (Bank of Sierra Leone). Productivity growth contributed the remaining 6%. From a sector perspective, the main sources of growth have been agriculture and services, due to their weight in the economy. Agriculture employs approximately 70% of the population and, as of 2008, accounted for approximately 44% of the GDP (Statistics Sierra Leone). The mining sector accounts for 5% of employment, 18% of GDP, and generates the majority of export receipts. Construction and manufacturing add another 7% of GDP. The manufacturing sector is small, with mainly import-substituting industries, and employs only approximately 2% of the labour force. The service sector, much of it informal, accounts for the remaining 31% of GDP.

**Figure 1: Sectoral contribution to GDP in Sierra Leone (2008)**



*Source: Central Statistics Office (Statistics Sierra Leone)*

## 2.2 Composition of Private Sector Investment in Sierra Leone

Private sector investment in Sierra Leone comprises indigenous (domestic private investment) as well as Foreign Direct Investment (FDI). Between 1980 and 2008, private sector investment rose from Le40.5 billion (US\$38.58 million) to around Le467.45 billion (US\$143.83 million). Of this amount, domestic private investment accounted for about 5.2% of GDP in 1980 and 6.16% of GDP in 2008, while Foreign Direct Investment net inflows accounted for about -1.7% of GDP in 1980 and 3.4% of

GDP in 2008. With the exception of 1987 and 1990 when FDI net inflows accounted for 5.97% and 4.99% of GDP, respectively, their contribution to private sector investment in Sierra Leone were negligible up to the year 2000.

**Table 2: Composition of private sector investment in Sierra Leone (1980-2008)**

Year	GDP (Le millions)	Total private investment (Le millions)	Domestic private investment (Le millions)	FDI, Net inflows (Le millions)	Domestic private investment as a share of GDP (%)	FDI, net inflows as a share of GDP (%)
1980	1155.5	40.5	60.1	-19.6	5.20	-1.70
1981	1,292.2	147.3	138.6	8.7	10.72	0.67
1982	1,604.5	125.2	119.4	5.8	7.44	0.36
1983	1,876.1	165.1	161.9	3.2	8.63	0.17
1984	2,729.5	294.8	280.1	14.7	10.26	0.54
1985	4,365.0	294.3	451.9	-157.7	10.35	-3.61
1986	7,888.0	505.8	2,763.7	-2,257.9	35.04	-28.62
1987	22,472.0	1,011.2	-330.4	1,341.6	-1.47	5.97
1988	34,305.0	1,350.0	2,100.7	-750.7	6.12	-2.19
1989	55,804.0	3,738.9	2,401.7	1,337.2	4.30	2.40
1990	98,386.0	5,671.8	759.7	4,912.1	0.77	4.99
1991	230,367.0	11,738.0	9,521.6	2,216.4	4.13	0.96
1992	339,609.0	11,781.0	14,577.4	-2,796.4	4.29	-0.82
1993	436,304.0	11,212.0	15,446.9	-4,234.9	3.54	-0.97
1994	535,019.0	22,292.0	23,978.4	-1,686.4	4.48	-0.32
1995	657,604.0	21,311.0	15,807.7	5,503.3	2.40	0.84
1996	867,072.0	26,543.0	25,931.7	611.3	2.99	0.07
1997	834,502.0	20,435.0	18,668.3	1,766.7	2.24	0.21
1998	1,051,330.0	23,000.0	22,836.0	164.0	2.17	0.02
1999	1,207,720.0	21,234.0	20,272.0	962.0	1.68	0.08
2000	1,330,320.0	35,654.0	-45,940.4	81,594.4	-3.45	6.13
2001	1,600,170.0	36,786.0	17,250.7	19,535.3	1.08	1.22
2002	1,964,630.0	47,654.0	25,795.9	21,858.1	1.31	1.11
2003	2,323,670.0	127,564.0	107,336.4	20,227.6	4.62	0.87
2004	2,894,330.0	132,145.0	-33,048.4	165,193.4	-1.14	5.71
2005	3,356,690.0	278,654.0	38,291.2	240,362.8	1.14	7.16
2006	4,274,047.9	297,864.0	123,798.4	174,065.6	2.90	4.07
2007	4,530,490.8	312,876.0	24,638.5	288,237.5	0.54	6.36
2008	4,892,930.1	467,453.0	301,433.2	166,019.8	6.16	3.39

*Source: World Bank indicators and author's calculations*

In 1986, there was a massive net outflow of Foreign Direct Investment in Sierra Leone (about 28.6% of GDP) following the implementation of Economic Emergency by President J.S. Momoh. This, coupled with the outbreak of a decade-long civil conflict (1991-2000) adversely affected FDI inflows between the mid 1980s and the 1990s.

However, following the conclusion of hostilities and the subsequent establishment of peace in 2000, the country once again attracted significant inflows of FDI (about 6.13% of GDP), mostly directed at the mining sector, and the telecommunication and fishing industries. Thus, between 2000 and 2008, FDI net inflows in Sierra Leone averaged around 4% of GDP annually (Statistics Sierra Leone). As a consequence, increased FDI inflows during the post-conflict period boosted private sector investment in Sierra Leone. For instance, in 2008, while indigenous private sector investment was 6.16% of GDP, Foreign Direct Investment stood at 3.39% of GDP, bringing total private sector investment to 9.55% of GDP.

## 2.3 Private and Public Sector Investment in Sierra Leone

Investment in manufacturing, mining, fishing, transport, and agricultural projects characterizes private sector activities in Sierra Leone. Although a good number of enterprises undertake light manufacturing and produce consumer goods such as plastic footwear, small items of furniture, clothing, beer, soft drinks, candles, matches, travel bags and sugar, huge investment activities have also been directed towards post-conflict infrastructural development, mining, fishing, hydroelectricity generation, road construction, education and provision of financial services. Manufacturing industries are more or less limited to converting imported semi-finished materials to consumer goods, with the exception of agro-based industries that depend on home-grown produce such as tobacco leaf for the manufacture of cigarettes, palm oil for margarine and soaps, timber for plywood and furniture, cocoa beans for cocoa butter, etc. Other investment opportunities, mainly classified as small-scale enterprises, include activities such as Gara dyeing, blacksmithing, cassava processing, soap making, tailoring, carpentry, and baking. By virtue of their small initial capital requirement, small-scale enterprises are the most dominant in Sierra Leone. Their significance lies in the fact that they provide self-employment opportunities for a great portion of the rural population.

The mining sector is the chief earner of foreign exchange, a major source of government revenue and an important provider of employment. Diamond, gold, bauxite, rutile and iron are the key minerals that dominate the mining sector. Several incentives were put in place to encourage the export of alluvial diamonds through official channels, including the maintenance of taxes and fees at only 2.5% of total export value. Mining regulations in support of the Mineral Act were drafted and enacted in December 1997. Promotional programmes were also initiated by the end of 1998 in a bid to attract investors in the mining industry. On account of this, the mining sector attracted about 80% of Foreign Direct Investment inflows in Sierra Leone. The recent discovery of off-shore oil deposits has also attracted various oil exploration companies.

Agriculture, besides being the mainstay of the Sierra Leone economy, is the largest source of employment (Statistics Sierra Leone). Agricultural exports include coffee, cocoa, palm oil, palm kernel, piassava and ginger. These products provide opportunities for new investors in both the growing and processing of raw materials. Opportunities also exist in the production and exportation of products such as cut flowers, fresh



beans, mushrooms, asparagus, mangoes, avocados, passion fruits, melons and chilies, to mention a few. There are large tracts of land yet to be exploited and which may be available on a long-term lease basis, or as part of a joint venture arrangement. It is estimated that only a third of the available arable land is currently under intensive cultivation. Most farmers grow rice (the country's staple food), although the quantity produced in recent times is insufficient for domestic consumption. This has resulted in a large quantity of rice being imported each year since the late 1970s.

Fisheries also constitute a major sector of the Sierra Leone economy open to private investment. Sierra Leone has approximately 485km of coastline rich in lobsters, shrimps and sharks. This provides a vast scope for fishing and related industries. Part of the production is for export, and the other part is for local consumption. The potential yield of the fisheries resources are estimated at around 200,000 mt annually, while current production is about 70,000 mt<sup>5</sup>. According to the Sierra Leone Export Development and Investment Cooperation's (SLEDIC) annual report of 1997, some 22 fishing companies were officially registered, with about 15 cold room facilities. There are about 6,000 canoes in the artisanal fishing sector, with only 16% motorized. There is a greater potential for fish farming and deep-sea fishing in the near future.

Investment opportunities also exist in hotels, restaurants, beach resorts along the coast, and other tourist services. There is an established Hotel Training School, which is meant to meet the needs of potential investors in the tourist industry. Although tourism has traditionally been an important source of foreign exchange and currently makes a growing contribution to the Sierra Leone economy in terms of employment opportunities, it is still under-developed, as the country's resources in this sector are yet to be exploited. According to the National Tourist Board of Sierra Leone, the tourist market in Sierra Leone can grow to make Sierra Leone a prime destination for tourists from Europe. In addition to that, the Sierra Leone Investment and Export Promotion Agency (SLIEPA) claims that out of a yearly total of 100,000 tourists received prior to the war, 90% were French nationals. The Bank of Sierra Leone also reported that hotel revenue grew at an average of 17% a year between 1980 and 1991 (see Bank of Sierra Leone Bulletin 1995). However, following the outbreak of the rebel war in early 1991, hotel revenue declined considerably, only picking up steadily since 2003.

Public sector investment, which accounted for about 42.5% and 52.14% of gross domestic investment in 1995 and 2007, respectively, is focused on infrastructural development, especially in the areas of electricity and water supply, construction of road networks, markets and regulatory institutions. In Sierra Leone, foreign aid has played an important role in post-war development efforts, and accounted for about 65% of funding sources for public sector investment between 2001 and 2005.

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5 These figures were reported by the Sierra Leone Export Development and Investment Cooperation (SLEDIC).

## 2.4 Trends in Private Sector Investment in Sierra Leone (1966-2008)

Private sector investment as a share of GDP rose from about 6.8% in 1966 to around 8.4% in 1977. This period characterizes a prosperous and stable era in the economic history of Sierra Leone. Between 1977 and 1980, private investment as a share of GDP declined steadily from 8.4% in 1977 to around 3.5% in 1980. The declining trend in private investment continued throughout the 1990s, reaching a minimum of 1.76% of GDP, and then reversing to initiate an upward trend following the conclusion of the civil conflict in 2000. Between 2001 and 2008, private investment as a share of GDP rose from 2.3% in 2001 to around 5.49% in 2003, declined slightly to 4.57% in 2004 and then rose steadily to 9.6% in 2008.

The declining trend in private investment observed in the 1980s and 1990s could be partly explained by the high cost of borrowing from the existing commercial banks. The lack of a well-developed domestic capital market constrained private investors's access to long-term capital. Thus, short-term commercial bank credit and informal financial markets were the only options available for private sector borrowing to finance investment projects. Given the limited number of commercial banks operating in Sierra Leone in the 1980s and the 1990s<sup>6</sup>, access to credit facilities was very difficult, at a time when the central government was also competing with the private sector in accessing the limited resources. The competition for commercial bank credit from both the central government and private sector resulted in hiking of the cost of borrowing, as banks tried to ration the limited credit by charging high interest rates. Thus, between 1966 and 2000, the average commercial bank real lending rates rose from 5.1% to 11.2% (see Table 1 of page 13). Thus, accessing loans for private sector investment became very costly, thereby adversely affecting private sector investment. In an effort to encourage private sector investment in agriculture by easing credit constraints, the Government of Sierra Leone established the National Development Bank (NDB) in 1979. By providing long-term credit facilities in the agricultural sector, the NDB became instrumental in creating an enabling environment for private sector investment activities during this period.

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6 There were merely three main banks with very few branches (Barclays Bank, Standard Chartered, and the Sierra Leone Commercial Bank ) operating in the country during this period.

**Table 3: Private and public sector investment in Sierra Leone (1966-2008)**

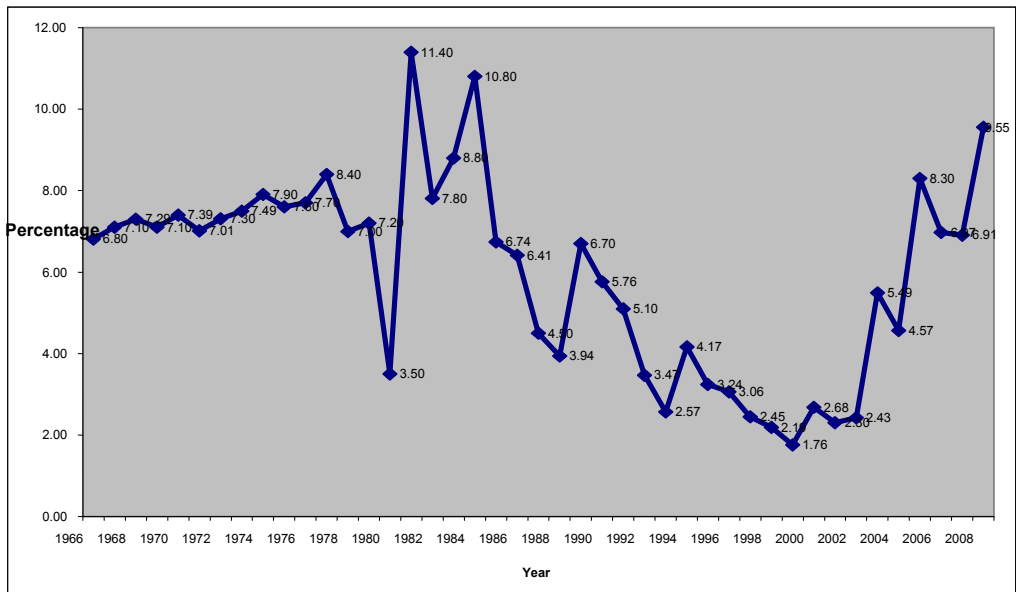
Year	GDP (Le millions)	Gross Investment (Le millions)	Public Investment (Le millions)	Private Investment (Le millions)	Public Investment as a % of GDP	Private Investment as a % of GDP
1966	261.90	38.9	21.1	17.8	8.05	6.80
1967	262.00	32.8	14.2	18.6	5.42	7.10
1968	275.20	31.7	11.6	20.1	4.22	7.29
1969	314.90	36.8	14.4	22.4	4.58	7.10
1970	355.30	53.4	27.1	26.3	7.64	7.39
1971	348.60	47.4	23.0	24.4	6.59	7.01
1972	355.80	42.7	16.7	26.0	4.70	7.30
1973	393.30	44.2	14.7	29.5	3.74	7.49
1974	477.80	56.6	18.8	37.8	3.94	7.90
1975	572.70	76.0	32.5	43.5	5.67	7.60
1976	613.50	71.5	24.3	47.2	3.95	7.70
1977	744.20	80.6	18.1	62.5	2.43	8.40
1978	850.10	99.7	40.2	59.5	4.73	7.00
1979	1,029.20	128.0	53.9	74.1	5.24	7.20
1980	1,155.50	171.6	131.1	40.5	11.35	3.50
1981	1,292.20	236.2	88.9	147.3	6.88	11.40
1982	1,604.50	205.1	79.9	125.2	4.98	7.80
1983	1,876.10	235.3	70.2	165.1	3.74	8.80
1984	2,729.50	331.8	37.0	294.8	1.35	10.80
1985	4,365.00	424.2	130.0	294.3	2.98	6.74
1986	7,888.00	729.7	223.9	505.8	2.84	6.41
1987	22,472.00	2,270.0	1,258.8	1,011.2	5.60	4.50
1988	34,305.00	1,837.0	487.0	1,350.0	1.42	3.94
1989	55,804.00	4,745.0	1,006.1	3,738.9	1.80	6.70
1990	98,386.00	9,398.0	3,726.2	5,671.8	3.79	5.76
1991	230,367.00	19,644.0	7,906.0	11,738.0	3.43	5.10
1992	339,609.00	35,128.0	23,347.0	11,781.0	6.87	3.47
1993	436,304.00	21,475.0	10,263.0	11,212.0	2.35	2.57
1994	535,019.00	43,901.0	21,609.0	22,292.0	4.04	4.17
1995	657,604.00	37,011.0	15,700.0	21,311.0	2.39	3.24
1996	867,072.00	78,163.0	51,620.0	26,543.0	5.95	3.06
1997	834,502.00	41,765.0	21,330.0	20,435.0	2.56	2.45
1998	1,051,330.00	59,204.0	36,204.0	23,000.0	3.44	2.19
1999	1,207,720.00	52,885.0	31,651.0	21,234.0	2.62	1.76
2000	1,330,320.00	84,761.0	49,107.0	35,654.0	3.69	2.68
2001	1,600,170.00	90,091.0	53,305.0	36,786.0	3.33	2.30
2002	1,964,630.00	114,690.0	67,036.0	47,654.0	3.41	2.43
2003	2,323,670.00	322,945.0	195,381.0	127,564.0	8.41	5.49

2004	2,894,330.00	311,721.0	179,576.0	132,145.0	6.20	4.57
2005	3,356,690.00	608,254.0	329,600.0	278,654.0	9.82	8.30
2006	4,274,047.94	641,412.0	343,548.0	297,864.0	8.04	6.97
2007	4,530,490.82	653,763.0	340,887.0	312,876.0	7.52	6.91
2008	4,892,930.09	857,712.0	390,259.0	467,453.0	7.98	9.55

*Source: Bank of Sierra Leone and Central Statistics Office (Statistics Sierra Leone)*

Apart from the high cost of borrowing to finance private investment in Sierra Leone, the increasing level of insecurity following the escalation of civil conflict in the mid 1990s also accounted for the decline in private sector investment experienced during this period. This is because, as the civil conflict escalated in the mid 1990s, many private firms, both indigenous and foreign-owned, were shut down. Foreign-owned private banks were also closed down, further aggravating the existing credit constraints facing the private sector.

**Figure 2: Trend in private investment as a share of GDP in Sierra Leone (1966-2008)**

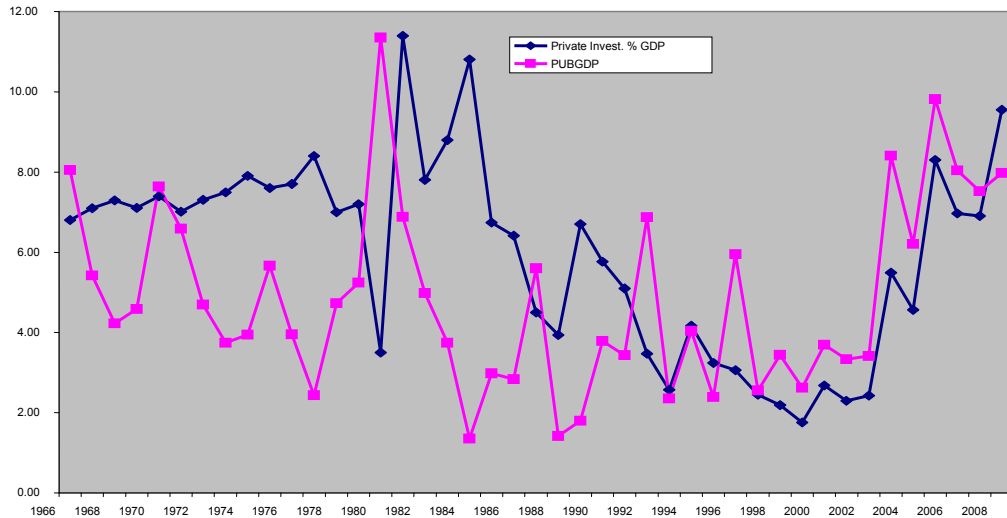


However, on account of the consolidation of peace following the full implementation of the Lome Peace Accord in 2000, the investment climate once again gained momentum. Between 2004 and 2008, private investment as a share of GDP rose steadily from 4.5% to 9.6% of GDP (Figure 2).

The relationship between private and public investment in Sierra Leone appears rather complementary, as shown in Figure 3. Prior to the 1990s, however, the degree of complementarity appears to be weak. This is largely due to the manner in which public investment was done in Sierra Leone. Prior to the 1990s, a significant proportion of public investment spending was geared towards the mining industry, with very little focus on infrastructural development. The establishment of the National Diamond Mining Company (NDMC) as well as the Marampa Iron Ore Mining Company (DELCO) by the Sierra Leone government, in partnership with some foreign investors, saw a huge amount of government spending directed towards the mining sector. In Sierra Leone, gold and alluvial diamond mining also offer substantial opportunities for private sector investment. The relatively low cost involved in carrying out alluvial diamond mining, as opposed to kimberlite mining, coupled with a more liberal mining policy in Sierra Leone, offers an avenue for private investors to compete with the government in the mining sector. Following the emergence of a democratic system of governance in the mid 1990s, performance became a serious criterion for a government to continue in office. Immediately after the war in 2000, and coupled with the support from the international community, infrastructural development attracted the attention of governments in power. As a result, many new roads were constructed, electricity supply enhanced and macroeconomic conditions relatively stabilized. This development,

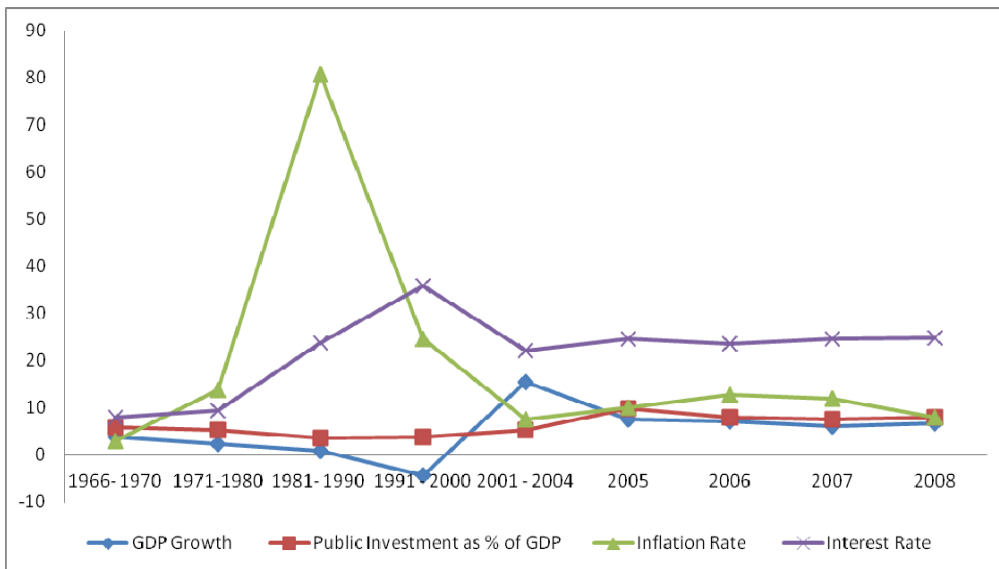
therefore, provided an economic atmosphere conducive to private sector investment. As can be observed in Figure 3, public and private investments apparently move in tandem since the year 2001. Little wonder GDP growth has been phenomenal in Sierra Leone since 2002.

**Figure 3: Relationship between private and public sector investment in Sierra Leone (1966-2008)**



Note: Percentage (%) on the y-axis and year on the x-axis

**Figure 4: Relationship between private investment, interest rates, inflation and GDP growth**

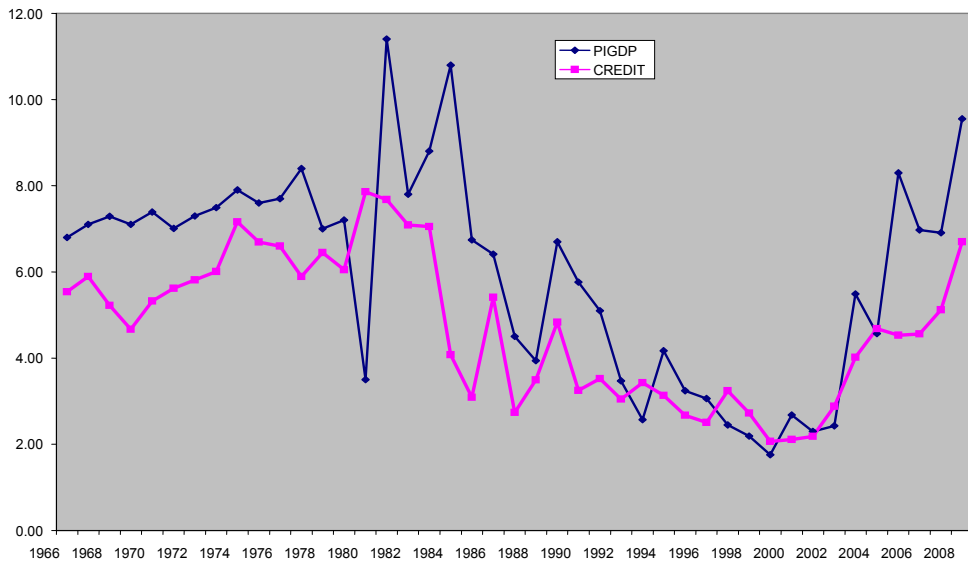


Note: Percentage (%) on the y-axis and year on the x-axis

The relationship between private investment as a share of GDP, lending interest rates, inflation and GDP growth in Sierra Leone between 1966 and 2008 is depicted in Figure 4. Low inflation and low lending interest rates accompanied high private investment during the period 1966-1970, as well as the 2005-2008 period, suggesting a negative correlation between private investment, inflation and interest rates in Sierra Leone. This suggests, in turn, that policies geared towards stabilizing inflation and interest rates may enhance private sector investment and, hence, growth.

Apart from bank lending rates, availability of credit to the private sector also played an important role in driving private sector investment in Sierra Leone. Credit constraints to the private sector have in many instances resulted in the rationing of financial resources in developing countries. In Sierra Leone, lack of credit opportunities has constrained private sector investment since the attainment of independence in 1961. The absence of a well-developed financial market capable of meeting the private sector's financial needs has over the years been reflected in persistently high interest rates. As shown in Figure 5, the availability of credit to the private sector shows some positive effects on private sector investment. Between 1966 and 1981, increased availability of credit to the private sector, from 5.4% to 7.8% of GDP, saw a corresponding increase in private investment as a share of GDP from around 6.8% to 11.4%. As can be further observed, the declining trend in credit availability to the private sector between 1982 and 2001, from 7.1% to 2.8% of GDP, resulted in a similar decline in private investment as a share of GDP from around 7.8% to around 2.6% (Figure 5). However, when credit to the private sector rose from around 2.9% to 6.7% of GDP between 2002 and 2008, private investment as a share of GDP rose from 2.4% to 9.6%. Figure 5, thus, shows a positive relationship between private sector investment and credit availability in Sierra Leone.

**Figure 5: Relationship between private investment and credit availability as a share of GDP**



Note: Percentage (%) on the y-axis and year on the x-axis



# 3. Literature Review

## 3.1 Theoretical Literature

Economists have at different points in time proposed various theories of investment over time. Keynes (1936) was the first to draw attention to the concept of an independent investment decision function. According to him, investment is considered the marginal efficiency of capital in relation to a given level of interest rate that reflects the opportunity cost of the investment capital. Keynes noted that investment can be worth undertaking if the present value of the future income stream from a given level of capital investment is equal to or greater than the initial cost of capital. According to Keynes, investment spending could be highly volatile, partly due to the underlying uncertainty associated with the expected returns on investment. This argument presented a strong case in explaining the concept of the business cycle. Keynes postulated that the decisions to undertake capital investment are based on what is referred to as the “animal spirit” of the investor. By this, he meant that investment decisions are affected by the level of optimism or pessimism that the investor construes about the general atmosphere within which the investment project is undertaken. This implies that the decision to invest or divest largely depends on the individual investor’s expectation of the possible outcome of the investment venture. Therefore, Keynes considered the volume of investment at any point in time as being largely determined by the investors’ rational expectations formation about the economic environment within which they operate.

Between 1950 and the early 1960s, the accelerator principle emerged as a dominant theory of investment due to the celebrated works of Keynes. This theory postulated a linear relationship between investment and output. One of the concepts of the accelerator theory of investment is that, given an incremental capital output ratio, it is possible to calculate the level of investment required to attain a given targeted level of output growth. A basic assumption of this theory of investment is that there is a fixed ratio of desired capital stock to output. The limitations of the accelerator principle emerged from the very simplistic assumptions that: (i) there is a fixed ratio of desired

capital stock to output; and (ii) there is enough investment to keep the desired capital stock at the actual capital stock. Owing to these limitations, the accelerator principle was later modified to the flexible accelerator principle of investment, which is based on the optimal accumulation of capital<sup>7</sup>. The basic assumption of the flexible accelerator principle is that investment is a function of the level of output and the user cost of capital. The user cost of capital is, however, dependent on the price of capital goods, the real interest rate, and the rate of depreciation of capital assets.

Greene and Villanueva (1991) claim that the neoclassical flexible-accelerator model has been the most widely accepted general theory of investment behaviour and that empirical tests of the model using data from several industrial countries have been quite successful. Greene and Villanueva cite, for instance, the works of Bischoff (1969), Hines and Catephoros (1970), and Jorgenson (1967, 1971). They also highlight the limitations of the flexible-accelerator principle as being hard to test in developing countries because of the two unrealistic assumptions of the model. They further point out that certain variables, such as capital stock, real wages, and real financing for debt and equity, are normally unavailable or inadequate.

In another development, Tobin (1969) pioneered one of the most challenging theories of investment, referred to as Tobin's Q-theory of investment. The central idea behind this theory of investment focuses is to measure the gap between the desired and actual level of capital stock. Sachs and Larrain (1993) advanced an appropriate definition of the "Tobin's q" as the ratio of the cost of the acquisition of a firm through the financial market to the cost of acquiring the firm's capital in the output market. With regard to this definition, if the value of  $q > 1$ , it indicates that the desired capital stock is greater than the actual level of the capital, meaning that the market value of the firm exceeds its cost. This implies, therefore, that investment is bound to rise. The reverse holds in the case where  $q < 1$ .

Another version of investment models branded as the "Disequilibrium Models of Investment" emerged in the 1980s. The origin of these models can be traced to the works of Malinvaud (1980; 1982) and Snesens (1987). These models were based on the idea that investment depends on profitability and output demand conditions. Malinvaud's point of view was that investment decisions can be disintegrated into two major stages. The first and foremost stage involves a decision relating to the expansion of productive capacity, which in turn depends on the level of capacity utilization in a given economy. The other stage involves decisions relating to the capital intensity of the extra capacity, which is dependent on the cost of capital and labour input. According to Serven and Solimano (1991), it is of relevance to have a distinction between the two decisions due to the assumption of Putty-Clay Technology, so that factor proportions are flexible *ex-ante* and rigid *ex-post*. In a sense, it thus implies that the proportions in which inputs are combined before investment vary, but are fixed thereafter. Snesens (1987) postulates that net investment is positively related to the gap between actual

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<sup>7</sup> The modification of the accelerator principle to the flexible = accelerator theory is associated with the works of Jorgenson (1967) and Hall and Jorgensen (1971).

and long-run equilibrium capacity. This gap is seen as reflecting the discrepancy between actual and equilibrium rates of capacity utilization (sales constraints), and actual and equilibrium mark-up rates (profitability). It is, thus, believed that these situations are what influence investment behaviour. The simplistic assumption upon which disequilibrium models are based has to do with rational expectation and market disequilibrium existing side by side. It is further argued that both the input and output market may not clear when rational economic agents anticipate future sales constraints, and price and wage rigidities. Thus, market disequilibrium can be combined to explain the determination of investment behaviour.

Owing to the irreversible nature of investment projects, recent literature has introduced an element of uncertainty in the analysis of investment behaviour (Pindyck, 1991). The assumption in this argument is that most capital goods are considered firm specific, and, sometimes, of low resale value. Therefore, disinvestment can be very costly, as there may be no alternative uses for such firm-specific capital goods. It is further argued that the net present value (NPV) rule needs modification due to the irreversible nature of certain investment projects. This is because it may be costly for the firm to disinvest should market conditions change adversely. Therefore, under conditions of uncertainty, considering the irreversible nature of capital goods, investment decisions can be delayed to give firms the opportunity to access information about the future. This is so because, once investment is made, shifting capital usage to other sectors is difficult, or liquidation is done at the risk of capital loss. According to Pindyck (1991), this loss option value is an opportunity cost that must be included as part of the cost. Pindyck further argues that the value of the unit of capital must exceed the purchase and installation cost by an amount equal to the value of keeping the investment option active.

In another development, Dixit and Pindyck (1994) argue that three main features characterize investment decisions. Firstly, investment decisions are quite irreversible in the sense that the initial cost of investment comprises a sunk component that cannot be retrieved once the investment decision is made. Such costs include expenses incurred on major infrastructure such as buildings, roads and bridges, and the purchase of certain types of machines. Secondly, Dixit and Pindyck argue that the decision to invest has a risk component arising from the uncertainty over the future outcomes from the investment project. This implies that the decision to undertake an investment project depends on the investor's assessment of probabilities of the outcomes associated with profit or loss. Thirdly, the timing of an investment decision is fundamental to the potential investor. This means that the investor has the option to postpone the investment decision in an effort to accumulate enough information about the future. These three features characterizing the decision to undertake investment projects are paramount in the process of determining optimal decision-making. If these arguments do hold, the implication is that the predictions of the earlier versions of the neoclassical models of investment, which lay emphasis on such factors as changes in interest rate, changes in tax policy, etc, are of less significance in determining private investment

when compared to the volatility and uncertainty of the economic environment. Dixit and Pindyck (1994) attempted to measure the degree of uncertainty of the economic environment by the level of fluctuation in prices, profits, input cost, exchange rates, and tax regulatory policies.

A good number of researchers, including Aschauer (1989), Luders (1991), Munnell (1990), Looney (1985) and Ramirez (1986), focus on the question of whether public and private investment are complements, substitutes or, as assumed in most macroeconomic models, independent of one another. In particular, Ramirez (1994) has argued that the economic rationale underlying these studies hinges on the idea that public investment is confined, by and large, to those goods and services that the private sector will not produce in optimal amounts because it is both hard to ration their use and benefits to paying customers (the free rider problem), and they are subject to substantial start-up costs (lumpy and indivisible investments). These public goods are, nevertheless, of critical importance to the proper functioning of a market system because they tend to generate large and widespread spillover benefits. Public investment is also considered to have an indirect effect on private capital formation because it not only augments overall aggregate demand for the goods and services produced by the private sector, but also influences private investors' future profit and sales expectations.

Other schools of thought have also deliberated on the issue of profits and sales as major determinants of private investment activities. Realized profits are said to act as guides to business people in making judgment about the prospect of future profits. The major drive in undertaking investment expenditure is centred on the expectation that the investment project will be profitable. In cases where there is limited access to investment funds through financial institutions (as in the case of developing countries), firms largely finance their investment from retained profit. The greater the level of profits, the higher the possibility of self-financing. Major works on the relationship between investment and profits/sales were done by Kuh (1963), Grunfeld (1960), and Eisner (1970).

## 3.2 Empirical Literature

A good number of studies have been carried out on the determinants of private sector investment in developing countries. Green and Villanueva (1991) studied the determinants of private sector investment using a sample of 23 developing countries. The main objective was to analyze the impact of various macroeconomic factors on private investment activities during the post-1974 period in a wide range of developing countries. The empirical evidence from this study shows that private investment has a positive relationship with real GDP growth, but is negatively related to domestic inflation, real interest rate, debt service ratio, and the ratio of debt to GDP. A critical finding in this study is that the results were more robust before the 1982 debt crisis. Using a similar model, Fielding (1994) also confirms a positive relationship between private investment and the level of GDP per capita. Ozler and Rodrick (1992) pioneered

a similar study using a sample of developing countries over the 1975-1985 period, but the results from this study revealed that the coefficient of GDP per capita was not significant in their investment model.

In an attempt to investigate the impact of government policy on private investment, Bleger and Khan (1984) collected data from a sample of 24 developing countries and found that private investment is positively related to changes in expected real GDP, the level of public sector investment, and credit availability. The study, however, found that private investment is negatively affected by excess productive capacity. This study confirmed the existence of a long run complementarity between private and public sector investment. In the short run, however, public sector investment and private investment are seen to be substitutes for one another. This is due to the fact that public sector investment usually crowds out private investment in most developing countries.

On the relationship between fiscal policy and private investment in developing countries, Chhibber and Dailamin (1990) find that private investment is positively related to the real deposit rate of interest. This positive relationship between real deposit interest and private investment is consistent with the McKinnon-Shaw (1993) hypothesis.

Oshikoya (1994) carried out a study on the macroeconomic determinants of private investment using a sample of seven Africa countries for the period 1970-1988. The results indicate that private investment is positively related to public sector investment and real interest rate for middle-income countries. For the low-income countries, the results showed a significantly negative relationship between private investment and inflation rate, but the negative relationship between private investment and real exchange rate was rather insignificant. The result, however, shows that availability of accessible domestic credit to the private sector has a positive and significant impact on the level of private investment activities in both low-income and high-income countries.

Chhibber and Wijnbergen (1988) undertook a study on public policy and private investment in Turkey and found that shifts in the composition of public expenditure towards the provision of major infrastructure had a positive and significant impact on private investment. The result seems plausible, especially in the case of developing countries where certain infrastructure such as good roads, efficient transport systems, electricity and communication facilities are either lacking or not well developed. Therefore, the improvement of such facilities by the public sector is very important in accelerating the much needed growth in developing countries.

Khan and Reinhart (1990) carried out a study on private investment and economic growth in developing countries. The conclusion from this study was that private and public investment had different effects on long-term economic growth. Private investment was seen as playing a much more significant role in the growth process than public investment. However, one of the shortcomings of this study was that it failed to consider the complementary effects of public investment on private investment. In another development, Asante (2000) studied the determinants of private investment behaviour in Ghana using data for the period 1970-1992. This study revealed that private

investment is positively driven by public investment, growth rate of real credit to the private sector, real exchange rate, and real interest rate. On the other hand, measures of macroeconomic instability and inflation have a negative and significant impact in Ghana. The main strength of this study is that it incorporated a number of macroeconomic variables that are expected to influence private investment in developing countries.

So far, no systematic empirical study on the determinants of private investment in Sierra Leone has been done. Furthermore, the theoretical as well as empirical literature on the reviewed works points out several controversies, as no consensus seems to be arrived at on the impact of certain macroeconomic variables on private investment. That is, while some studies show a positive relationship, others show a negative relationship between the same set of macroeconomic variables and private investment. It is, thus, necessary to carry out a study of this type to provide empirical evidence for Sierra Leone.

# 4. Methodology

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## 4.1 Model Specification

This section specifies an appropriate model of private investment behaviour based on the empirical evidence by Solimano (1990), Chhibber and Shafic (1990), Bleger and Khan (1984), Chhibber and Van Wijnbergen (1988), Musalem (1988), and Schmidt-Hebel and Muller (1991). These studies were based on a more flexible version of the accelerator principle to account for factors that capture the behaviour of private investment decision-making in developing countries. Thus, this study adopts a model specification procedure following a variant of the flexible accelerator principle in line with the objective of capturing the main determinants of private investment in Sierra Leone.

Equation 9 (in Appendix A ) has the type of investment models that have been used in several empirical studies. This model tries to incorporate variables that best capture the nature of the private investment decision. On the basis of the derivation in Appendix A, the current study will, therefore, specify a private investment model as

Where:

*PIV* = private investment as a share of GDP

*RGDP* = real GDP

*PUBINV* = public investment as a share of GDP

*CREDIT* = credit to the private sector as a ratio of GDP

*RI* = real interest rate

$INF$  = rate of inflation

$DUM$  = a dummy variable taking the value of one between 1991 and 2000 and zero otherwise

$\mathcal{E}_t$  = the error term

The expected signs of the coefficients for the private investment model are shown in Table 4.

**Table 4: Expected signs of the coefficients of the private investment model**

Variable	Expected sign
RGDP	+
PUBINV	±
RI	-
CREDIT	+
INF	±
DUM	-

The coefficient of the variable representing real GDP (RGDP) is expected to be positive. This is because as real GDP increases, aggregate demand will rise, thereby stimulating an increase in the production of goods and services through investment undertakings.

The sign of the variable representing public sector investment (PUBINV) is expected to be mixed. It is expected to be positive if public investment is directed towards the development of infrastructural facilities such as good roads, electricity, transport and communication. However, if the method of financing public sector investment imposes constraints on the private sector's access to domestic financial resources (i.e. if the government is heavily borrowing from domestic financial institutions, this will constrain private investment with regard to accessing loans from these institutions), it limits the ability of private sector investors to raise funds to finance investment activities. In that case, increase in public sector investment may be expected to have a negative effect on private investment.

The coefficient of the variable representing the real interest rate (RI) is expected to be negative because a lower real interest rate means low cost of borrowing investment funds. This may increase the expected profit margin, and hence raise investors' willingness to borrow at low cost to undertake investment projects. On the other hand, if the real interest rate is high, investment funds will be obtained at higher costs, consequently reducing profitability, and hence investors willingness to borrow to undertake investment activities.

The coefficient of the variable representing credit availability to the private sector as a share of GDP (CREDIT) is expected to be positive. This is because an increase in credit availability to the private sector will increase private sector investment as it reduces the financial constraint. In most developing countries with low availability



of credit to the private sector, private investors face serious constraints in mobilizing the required financial resources to undertake investment projects. Thus, increased availability of credit opportunities to the private sector is expected to induce private sector investment.

The coefficient of the variable representing inflation (INF) is expected to be negative or positive. It is argued in economic literature that high domestic inflation can adversely affect the level of private investment due to the level of risk associated with long-term investment activities. This is as a result of the consequent distortionary effect of information signals that indicate the level of macroeconomic instability generated by both external and internal shocks in the economy. Another popular opinion in the literature is that unfavourable terms of trade resulting from high inflation periods will trigger an increase in the cost of imports relative to income earned from exports, thereby depressing the purchasing power of income generated from export earnings. Oshikoya (1994) noted that severe terms of trade may worsen the ratio of current deficit to GDP – an indicator of external balance and macroeconomic stability, with adverse consequences on private investment. He further argued that fluctuating world prices will not only induce macroeconomic uncertainty, but may exert an impact on inflation, real exchange rates, resource allocation and the overall investment outlook. According to the Model-Tobin effect, however, a higher anticipated inflation rate leads to a lower real interest rate, which will result in portfolio adjustment away from real money balances towards real capital. This, therefore, implies that higher inflation would induce an increase in real investment activities by private economic agents. Therefore, anticipated inflation is seen to have a positive impact on private investment.

The variable representing the effect of the war (DUM) on private sector investment is expected to be negative. This is because the ten-year civil conflict in Sierra Leone caused both political and macroeconomic instability, which adversely affected the investment climate. Thus, political instability following an outbreak of civil conflict is expected to have a negative impact on private investment.

## 4.2 Method of Analysis

The study first examines the time series properties of the data set by carrying out unit root tests for stationarity. Though there exists several tests for stationarity<sup>8</sup>, this study will use the Dickey-Fuller as well and Philips-Perron class of tests for unit roots. The traditional view of the unit root hypothesis was that current shocks only have a temporary effect, and the long-run movement in the series is unaltered by such shocks. This view was challenged by Perron (1989), who argues that in the presence of a structural break, the standard ADF tests are biased towards the non-rejection of the null hypothesis. Perron argues that most macroeconomic series are not characterized by a unit root, but rather, persistence arises only from large and infrequent shocks, and the

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8 Some tests for stationarity are based on the correlogram, the Box-Pierce Q statistic and the Ljung-Box (LB) statistic.

economy returns to a deterministic trend after small and frequent shocks. According to Perron, most macroeconomic time series are not characterized by the presence of a unit root. Fluctuations are indeed stationary around a deterministic trend function. The only shocks that have had persistent effects are the 1929 crash and the 1973 oil price shock (see Perron, 1989). Perron's (1989) procedure is characterized by a single exogenous (known) break in accordance with the underlying asymptotic distribution theory. He uses a modified Dickey-Fuller (DF) unit root test that includes dummy variables to account for exogenous structural breaks. Following Zivot and Andrews (1992), structural break points are determined using a sequential unit root testing procedure, which uses the full sample and a different dummy variable for each possible break date. Perron's (1989) unit root tests allow for a break under both the null and alternative hypothesis. These tests have less power than the standard DF type test when there is no break. Based on Perron (1989), the following three equations are estimated to test for the unit root. The equations take into account the existence of three kinds of structural breaks: (i) a 'crash' model, represented in equation (1), which allows for a break in the intercept of series; (ii) a 'changing growth' model, represented in equation (2), which allows for a break in the slope; and (iii) one that allows both effects to occur simultaneously, i.e. one time change in both the level and the slope of the series, which is represented in equation (3).

$$y_t = \alpha_0 + \alpha_1 D_{t-TB} + d(DTB)_t + \beta t + \rho y_{t-1} + \sum_{i=1}^p \phi_i \Delta y_{t-1} + e_t \quad 1$$

$$y_t = \alpha_0 + \gamma D_{t-TB} + d(DTB)_t + \beta t + \rho y_{t-1} + \sum_{i=1}^p \phi_i \Delta y_{t-1} + e_t \quad 2$$

$$y_t = \alpha_0 + \alpha_1 D_{t-TB} + d(DTB)_t + \gamma D_{t-TB} + \beta t + \rho y_{t-1} + \sum_{i=1}^p \phi_i \Delta y_{t-1} + e_t \quad 3$$

Where the intercept dummy  $D_{t-TB}$  represents a change in the level;  $D_{t-TB} = 1$  if  $(t > TB)$  and zero otherwise; the slope dummy,  $D_{t-TB}$ , represents a change in the slope of the trend function; i.e.  $D_{t-TB} = t - TB$  (or  $D_{t-TB} = t$  if  $t > TB$ ) and zero otherwise; the crash dummy  $(DTB) = 1$  if  $t = TB + 1$ , and zero otherwise; and  $TB$  is the break date. Each of the three models has a unit root with a break under the null hypothesis, as the dummy variables are incorporated in the regression under the null. The alternative hypothesis is a broken trend stationary process. If the variables entering the analysis are found to be stationary with breaks, then the study will estimate the parameters of the specified private investment equation following an Ordinary Least Squares approach. Prior to the estimation of the investment equation as specified in the previous section, the time series properties of the data set was examined by conducting some tests of stationarity using Perron's (1989) procedure. In addition to the tests of stationarity, some other diagnostic tests were used to appraise the robustness of the estimated investment equation using appropriate econometric criteria.

## 4.3 Data Sources

The data set used in carrying out the analysis in this study was collected from annual time series spanning 1966 to 2008 on key macroeconomic variables, including private sector investment, public sector investment, gross domestic product, lending interest rate, credit to the private sector, and consumer price index. The data set was collected from three main sources: the World Bank (WDI), International Finance Statistics (IFS), and the Sierra Leone Central Statistics Office (Statistics Sierra Leone) annual publications.

# 5. Presentation and Analysis of Results

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## 5.1 Time Series Properties of the Data

To avoid the problem of spurious correlation that is normally associated with the inclusion of non-stationary series in regression models, appropriate tests of stationarity were employed. In carrying out the test for stationarity, we compared the results obtained from the ADF test without taking into consideration structural breaks to those obtained from the Perron (1989) approach, which takes into account structural breaks in the data. Using a simulation approach in implementing the Perron (1989) unit root test, two major structural breaks were detected in the data set for the years 1980 and 1991. The Perron (1989) unit root test takes into account both an innovative outlier (IO) and an additive outlier (AO). Following Zivot and Andrews (1992), structural break points in this analysis were determined by using a sequential unit root testing procedure, which utilizes the full sample and a different dummy variable for each possible break date. The results for both the Augmented Dickey-Fuller (ADF) and Perron (1989) tests are as shown in Table 5.

**Table 5: Results of the stationarity tests for the time series variables**

Series	ADF test with a drift and trend (No structural breaks accounted for)	Perron (1989) test with structural breaks accounted for. (Years of break = 1980 and 1991 )	Critical values		Critical values	
			ADF test		Perron (1989) test	
			5%	1%	5%	1%
LPIV	-2.1441	-4.3546**	-3.2412	-4.3262	-3.1301	-4.2843
LPUBINV	-2.4813	-5.9569**	-3.2563	-4.3412	-3.2134	-4.3143
LRI	-2.3370	-4.9637**	-3.3421	-4.5323	-3.3214	-4.5234
LRGDP	-2.3224	-4.8696**	-3.452	-4.3421	-3.4231	-4.4112
LCREDIT	-2.7342	-5.6457**	-3.2312	-4.2318	-3.2256	-4.2012
INF	-2.8312	-6.3422**	-3.1232	-4.2134	-3.1034	-4.4134

\*(\*\*) implies reject the null hypothesis of non-stationarity at 5% and 1%, respectively.

As can be observed from Table 5 above, the results from the ADF test (which does not account for structural breaks) show that all the variables are non-stationary in levels, even with the inclusion of a drift and a trend. This is because the null hypothesis of unit roots is not rejected at the 5% level of significance. On the other hand, when we account for structural breaks in the data set following Perron's (1989) approach, the results from the unit root test show that all the variables are stationary, with two major breaks (in 1980 and 1991). This is because the null hypothesis of unit root is rejected at the 1% level of significance for the Perron (1989) unit roots test. Thus, the empirical evidence from the unit root tests as presented above show that the series are stationary with exogenous breaks.

## 5.2 Modeling the Private Investment Equation

Since the results from the unit root tests as presented in the previous section revealed that the data entering the current analysis are stationary with exogenous breaks, this guaranteed estimation of the specified private investment equation by the Ordinary Least Square (OLS). The results of the private investment equation using the Ordinary Least Square estimation procedure is presented in Table 6.

**Table 6: Results of the Ordinary Least Square estimates for the private investment equation**

Variables	Equation (1)	Equation (2)
Constant	-3.8128 [-2.5086] **	-1.1526 [-1.6753]
LPINV_1	-----	0.16573 [2.6734]**
LRGDP	1.8287 [2.9401]***	0.6923 [2.5247]***
LPUBINV	1.2680 [2.2212]**	0.18745 [2.0178]**
LCREDIT	0.6152 [3.2116]***	0.5089[3.0348]***
LRI	-0.3616 [-2.7545]**	-0.3118[-2.1987]**
INF	-0.0029 [-2.8132]**	-0.0017[-1.893]*
DUM	-0.3289 [-1.8152]*	-0.3105[-1.8063]*
Diagnostic Tests	$R^2 = 0.858748$ $AR\ 1 - 2F(2, 40) = 2.7243 [0.0987]$ $ARCH\ 1\ F(1, 40) = 0.0281 [0.9702]$ $Normality\ \chi^2(2) = 5.8271 [0.0592]$ $X^2\ F(12, 11) = 0.8631 [0.7213]$ $DW = 2.42$ $RESET\ F(1, 40) = 0.7835 [0.3942]$	$R^2 = 0.898748$ $AR\ 1 - 2F(2, 40) = 2.6173 [0.0874]$ $ARCH\ 1\ F(1, 40) = 0.0263 [0.8301]$ $Normality\ \chi^2(2) = 5.7621 [0.0487]$ $X^2\ F(12, 11) = 0.7981 [0.7213]$ $DW = 2.39$ $RESET\ F(1, 40) = 0.7391 [0.3817]$

\*(\*\*) and (\*\*\*) implies significance at 10%, 5% and 1%, respectively.

First, we carried out diagnostic tests to check the model for data consistency. The diagnostic test summary results as shown in the lower block of Table 6 indicate that there is no problem of residual non-normality. This is because the test for normality based on the Jacque Bera statistics does not reject the null hypothesis of normality of the residuals. The test based on the Lagrange Multiplier (LM) also indicates the absence of serial correlation in the residuals. This result is also supported by the Durbin-Watson's (DW) statistics as shown above. The LM test for Autoregressive Conditional Heteroscedasticity (ARCH) indicated the absence of ARCH effects. Finally, the RESET test also confirmed that there is no functional mis-specification problem.

As reported in Table 6, the results from the private investment equation revealed

that real GDP has a positive and significant impact on private investment in Sierra Leone. This finding provides support for the second hypothesis of the study, which says “Private investment in Sierra Leone is positively related to real GDP”. This is not surprising since an increase in real GDP, all things being equal, is expected to induce an increase in aggregate demand for investors’ products, thereby providing an incentive for private investment. The positive relationship between real GDP and private investment is also demonstrated by the dynamic private investment equation shown in column 3 (equation 2 of Table 6). Thus, the positive relationship between private investment and real GDP as established in this study is consistent with the findings of Greene and Villanueva (1991), Fielding (1994, 1995) and Blejer and Khan (1984).

With respect to the relationship between private and public investment, the results as presented in Table 6 indicate a positive and significant relationship. This is confirmed in both the static and dynamic private investment equations as shown in Table 6. This implies that an increase in public sector investment induces private sector investment in Sierra Leone. The result, therefore, provides evidence supporting the second hypothesis that “Public sector investment boosts private investment in Sierra Leone”. This positive relationship between private and public sector investment as shown in this study is consistent with the empirical evidence from the studies by Blejer and Khan (1984), Oshikoya (1994), Chhibber and Wijnbergen (1988), and Asante (2000).

The relationship between credit availability and private sector investment is positive and significant in both the static and dynamic private investment equations. This indicates that credit availability positively drives private sector investment in Sierra Leone. This finding reveals that an increase in the availability of credit to the private sector is important in fostering private sector investment by easing the financial constraints of the private sector. This finding also supports the fourth hypothesis of the study, which states that “Credit supply to the private sector promotes private sector investment in Sierra Leone”. This result is consistent with the findings of Oshikoya (1994) and Asante (2000), who also found that credit to the private sector induces private sector investment.

The relationship between real interest rate and private investment is negative and significant in both equations. This is not surprising because the higher the real interest rate, the higher the cost of borrowing financial resources for investment purposes, and hence the lower the level of private sector investment. Thus, the negative relationship between private investment and lending interest rate as found in this study provides support for the third hypothesis of the study, which says “The rate of interest negatively affects the level of private investment in Sierra Leone”. This is so because an increase in real rate of interest raises the user cost of capital, thereby making investment less profitable. Thus, the level of private investment is expected to decline as the real rate of interest continues to rise. The study by Greene and Villanueva (1991) supported a negative relationship as found in this study.

The relationship between inflation and private investment is negative and highly significant. This means that an increase in domestic prices, all other things being equal,

adversely affects private sector investment in Sierra Leone. This is not surprising because high domestic inflation will raise the local cost of production through increases in the cost of resource inputs. This also means that local products will be relatively expensive as compared to their foreign counterparts, thereby affecting the demand for locally produced goods and services. The ultimate effect will be a decline in investment activities domestically. This finding is consistent with the fifth hypothesis of this study, which states that “Inflation negatively impacts on private sector investment in Sierra Leone”. The empirical evidence by Greene and Villanueva (1991) provided support for this negative relationship between private investment and inflation as found in this study.

The war dummy (DUM) has the appropriate sign and is significant at the 10% level. This is not surprising because when the civil conflict in Sierra Leone started in 1991, there was an upsurge in both macroeconomic and political instability, thereby creating an unfavourable atmosphere for private sector investment. This ugly development, coupled with the imposition of an embargo on Sierra Leone by the United Nations in 1997, provoked a total collapse of economic activities. Thus, the negative relationship between civil conflict and private investment as obtained in this study confirms the adverse impact of the ten-year war on private investment in Sierra Leone. This is consistent with the sixth hypothesis of the study, which states that “The ten year civil war adversely affected private sector investment in Sierra Leone”.



## 6. Conclusion

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This study primarily intended to ascertain the macroeconomic determinants of private sector investment in Sierra Leone using data for the period 1966-2008. A private investment model for Sierra Leone is specified following a more flexible version of the accelerator model using time series data. The methodology adopted in this study uses a more robust procedure in examining the time series properties of the data set following the approach by Perron's (1989) unit roots test for stationarity. The unit root tests for stationarity revealed that the variables entering the analysis are all stationary with exogenous breaks, justifying the estimation of the specified investment equation by Ordinary Least Square (OLS). The results from the estimated investment equation show that while private investment in Sierra Leone is positively driven by public sector investment, real GDP and credit availability, it is negatively driven by inflation, real interest rate and the ten-year civil conflict. To boost private investment in Sierra Leone, there is need to raise public sector investment in infrastructural development, encourage the development of a viable financial market capable of meeting the private sector's financial needs by increasing credit availability, support activities directed towards boosting GDP growth, and implement appropriate macroeconomic policies with a view to mitigating interest rates and inflationary pressures to encourage private sector investment.

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# Appendix

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## Derivation of a Private Investment Model

According to the accelerator principle, the desired capita stock at any time period is proportional to the expected level of output. Mathematically, this proposition is expressed, thus:

$$K_t^* = \alpha Y_t^e \quad 1$$

Where  $K_t^*$  is defined as the desired capital stock by the private sector in period t,  $Y_t^e$  is the expected level of output in period t, and  $\alpha$  is a constant representing the capital output ratio. At any time period t, the desired level of gross fixed investment can be decomposed into two parts. This first consists of an addition to the existing stock of capital, while the second part consists of the replacement of worn out capital known as depreciation. This can be represented, thus:

$$I_t^* = K_t^* - K_{t-1} + \delta K_{t-1} \quad 2$$

By simplifying equation 2 above and introducing the lag operator in equation 2 (i.e.  $LK_t^* = K_{t-1}$ ), we have:

$$I_t^* = [1 - (1 - \delta)L]K \quad 3$$

From equation 1, the accelerator principle was expressed as  $K_t^* = \alpha Y_t^e$ . Now, by substituting for  $K_t^*$  in equation 3 above, we have:

$$I_t^* = [1 - (1 - \delta)L]\alpha Y_t^e \quad 4$$

where  $I_t^*$  = the desired level of investment in period t,  $\delta$  = the rate of depreciation of capita stock, L = the lag operator, and  $Y_t^e$  = the expected level of output in period t.

In order to incorporate the effect of time lag between the planning and implementation period of the investment project, partial adjustment models were introduced in later versions of the flexible accelerator models of investment. In these models, actual gross

investment is assumed to adjust to the difference between desired investment in period  $t$  and the actual investment in period  $t-1$ . The adjustment process of such investment models can be represented thus:

$$(I_t - I_{t-1}) = \phi(I_t^* - I_{t-1}) \quad 5$$

where

$I_t, I_{t-1}$  = the level of actual investment in periods  $t$  and  $t-1$ , respectively, and  $\phi$  = the speed of adjustment whose value is assumed to lie between zero and one.<sup>9</sup>

Several attempts have been made to determine the speed of adjustment with which private industrial investment responds to the difference between desired and actual investment. Recent empirical works by Blejer and Khan (1984) and Chhibber and Van Wijnbergen (1988) identified such factor as expectation of profitability, credit availability, government expenditure policies, and real interest rate as having significant impact by way of influencing the ability and initiatives of private investors to implement their investment projects. Empirically, these factors were thought of as affecting the speed of adjustment. Thus, they attempted to model the speed of adjustment by incorporating the above factor in a mathematical formulation presented as:

$$\phi = \phi_0 + \frac{1}{(I_t^* - I_{t-1})} [\phi_1 \Pi + \phi_2 RI + \phi_3 C + \phi_4 G] \quad 6$$

Where  $\Pi$  represents profit,  $RI$  is the real interest rate,  $C$  is real credit availability, and  $G$  is government real expenditure. Now, by substituting the value of  $\phi$  in equation (6) into equation (5), we have:

$$I_t = [\phi_0 + \frac{1}{(I_t^* - I_{t-1})} (\phi_1 \Pi + \phi_2 RI + \phi_3 C + \phi_4 G)] (I_t^* - I_{t-1}) \quad 7$$

On further simplifying the LHS of the above equation, we have:

$$(I_t - I_{t-1}) = \phi_0 (I_t^* - I_{t-1}) + \phi_1 \Pi + \phi_2 RI + \phi_3 C + \phi_4 G$$

$$I_t = \phi_0 I_t^* + \phi_1 \Pi + \phi_2 RI + \phi_3 C + \phi_4 G + (1 - \phi_0) I_{t-1} \quad 8$$

From equation 4, we have  $I_t^* = [1 - (1 - \delta)] LY_t^e$ . Now by substituting equation 4 in equation 8 we have:

$$I_t = \phi_0 [(1 - (1 - \delta))] LY_t^e + \phi_1 \Pi + \phi_2 RI + \phi_3 C + \phi_4 G + (1 - \phi_0) I_{t-1} \quad 9$$

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9 With this representation, there will be complete adjustment if  $\phi = 1$ . If  $\phi = 0$ , it implies no adjustment at all. The closer the value of  $\phi$  is to one, the higher the speed of adjustment. The reverse is the case when the value of  $\phi$  tends to zero.

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