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INSTABILITY OF PUBLIC SECTOR INVESTMENT

R.M.Sundrum

Centre for Development Studies
Úlloor, Trivandrum 695011

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Introduction

In Indian planning, one of the most important instruments for government to promote the country's development is public sector investment. There has therefore been great interest in the level and growth of such investment. There has, however, been less discussion of the instability of public sector investment, which is also important. This paper deals with some aspects of the causes and consequences of such instability.

In studies of export instability, it has generally been found that in cases where exports are growing rapidly, they are also accompanied by a high degree of instability; in these cases, the instability may be attributed to the rapidity of growth itself. But it has also been found that slow growth of exports is also accompanied by a high degree of instability (see e.g. Sundrum, 1983, Table 11.1 p. 228). In this case, it is likely that instability itself may be a cause of slow growth of exports. This may be a fairly general relationship between instability and growth, especially in cases where the impulses to growth are themselves rather weak.

One theoretical explanation is of an essentially statistical nature. Consider a variable X_t which grows at a fluctuating rate r_t and attains a value X_K after K years. Then it can be shown that X_K will be less than the value $\bar{X}_K$ which the variable would have attained if it had grown steadily at the average rate of growth m instead of the fluctuating rates by a factor depending on the instability of the actual growth rates:

$$\bar{Y}_K = \bar{X}_K \left[1 - \frac{k}{2}\left(\frac{m}{1+m}\right)^2 (CV)^2\right]$$

where CV is the coefficient of variation of the annual growth rates. It is easy to verify that this relationship holds exactly for k = 2 and approximately for k > 2. For example, for k = 30, m = 2.7 per cent per annum and CV = 2.3 (the values of the parameters of the growth rates of GDP in the agricultural sector in the past 30 years), the actual value is about 5.6 per cent less than what it would have been if growth had been steady at the average rate actually observed, i.e. a "loss" of nearly 1 per cent every five years.

However, this is only a statistical effect of instability on growth, in that it assumes that all other factors affecting growth are unaffected except that growth is steady. In practice, it is likely that instability of growth will affect these other conditions, especially the state of confidence, and the increase in uncertainty surrounding decision making will have more serious effects on the growth process.

Instability of Public Sector Investment

In a less-developed country like India, there is a great deal of instability in the output of the agricultural sector, a major sector of the economy, because of its heavy dependence on weather conditions. The instability in this sector will have severe adverse effects on the whole economy. Ultimately, the solution lies in sufficient investment, especially in irrigation and flood control, and the use of modern technol Already this approach has made a difference in parts of the country.

r example, it has been argued that "Punjab is the only state to record steady growth rate over the period. This could be attributed to the ge-scale adoption of new technology in the agriculture of the State ch facilitates to withstand drought conditions and thereby dampens the ctuations in output." (RBI Bulletin, September 1981, p.814). The e rapidly such a new technology is spread over the whole country, the s vulnerable the economy will be to the instability originating in ural factors, and its adverse effects on growth. But even with greater ects in this direction, the resources required to tame the natural tors by investment and extension of modern technology are so great that will take a long time to stabilize agricultural growth. Therefore, the medium term, an important task of policy is to insulate the rest the economy from the fluctuations of agricultural output as far as sible. An important instrument for this purpose is public sector estment.

The fluctuations in the growth rate of public sector investment real terms (i.e. in 1970/71 prices) are illustrated in Fig.1.

Figure 1

CSO estimates of public sector investment in 1970/71 prices are ilable only for part of the period. Therefore, estimates for the le period have been made for the present exercise by taking the CSO imates of public sector investment in current prices classified by or type of assets — construction, machinery and equipment, and nges in stock — and deflating them by the price indices of these

types of assets, as given in the Report of the Raj Committee on Savings

The above figure clearly shows the great instability of public sector investment growth rates in real terms. These growth rates over the past three decades had an annual average of 8.68 per cent and a coefficient of variation of 1.72. The situation has been aptly described by Dr.Vikas Chitre (1981, p.93) as follows: "To the ever present causes of fluctuations such as the fluctuations in agricultural production, the fluctuations in the private business investment in fixed capital and inventories, and the fluctuations in the world economic activity, the planning era in the country has added a new factor causing fluctiations, viz., the fluctuations in the public sector investment in fixed capital and stocks. The fluctuations in the public sector investment in fixed capital and stocks have been quite sharp in India over the twenty-five years of planning, and they seem to have accentuated rather than mitigated the fluctuations arising out of the other causes."

Some Consequences

We now turn to consider the causes and consequences of the instability in public sector investment. For this preliminary study, we rely mainly on the method of calculating the coefficient of variation of annual growth rates of various related magnitudes, and the correlations of the growth rates in pairs of such magnitudes.

One consequence of the unstable growth of public sector investment is simply the statistical effect mentioned above. Then, we see that the tottal investment that was actually carried out in the public sector over the past nearly three decades (1950/51 to 1978/79) was 6.75 per cent less than it would have been if this investment had grown steadily at the same

average rate. The actual public sector investment in 1978/79 was 23 per cent lower than if it had grown since 1950/51 at a constant rate equal to the average (corresponding to the approximate estimate of less of 28 per cent given by the formula (1).

But other consequences have probably been even more serious. A considerable amount of discussion has focussed on the relationship between public sector investment and output in the manufacturing sector. It has been argued, on the basis of DGTD data on gross output of the sector, that there has been a deceleration in the growth of this output since the mid-sixties; however, the data on value added shown by estimates of GDP in the sector do not show much deceleration (cf. I.J.Ahluwalia, 1982). However, there is still considerable fluctuation in the growth rates of manufacturing GDP, with an average over the whole period of 5.7 per cent per annum and a CV of 0.6.

Some of the relationships involved are illustrated in Fig.2. In this figure, the number next to a variable is the CV of its growth rates, and the number on the line joining two variables is the simple correlation coefficient between the growth rates of these variables.

A number of authors have argued that there has been a deceleration in the growth of manufacturing which was due to the level of production in agriculture. Similarly, it may be argued that the fluctuations in manufacturing also reflect the fluctuations in agriculture. The relationship has been assumed to work partly on the supply side through the agricultural raw materials used as inputs in the agro-based industries and on the demand side through changes in income of the agricultural

sector and its effective demand for manufactures (see e.g. Rangarajan, 1982). In fact, manufacturing GDP growth rates lagged one year had a positive correlation of 0.25 with agricultural GDP growth rates. This relationship is certainly important but it may not be sufficient to explain all the trends and fluctuations in the manufacturing sector. In particular, any deceleration tendency in the manufacturing sector cannot be explained only in terms of a corresponding tendency in agriculture, where the average growth rate has not declined since the late sixties and may even be slightly higher in the later period. There is a considerable correlation between agricultural GDP growth rates and growth rates of non-manufacturing non-agricultural GDP, which latter are highly correlated with manufacturing GDP growth rates, but there is practically no correlation between growth rates of agricultural GDP and private sector investment, which however is correlated with manufacturing GDP growth rates.

It is therefore useful to consider the alternative explanation that agriculture affects manufacturing indirectly through public sector investment. Srinivasan and Narayana (1977) and Patnaik and Rao (1977) have argued this point with regard to the levels of activity. As far as the transmission of fluctuations is concerned, the point is also confirmed when we consider annual growth rates. While agricultural growth rates influenced public sector investment growth rates (correlation = 0.22 with one year lag), the latter have influenced manufacturing GDP growth rates (correlation = 0.34). Similarly, we find close positive relationship between public and private sector investments, and between private sector investment and manufacturing GDP growth rates. There is

similar set of influences on non-manufacturing non-agricultural
P growth rates. It seem therefore that public sector investment
ays a significant role in transmitting the fluctuations of the agri-
ltural sector to the rest of the economy, or otherwise causing fluctua-
ons in the other sectors. It is also easier to see why this should
so, for the manufacturing sector especially is likely to be geared
re to meet the sort of demand arising from public sector investment
also to use the services of such investment as inputs. In view of
e importance of the public sector investment in its effects on the
nomy, we turn to consider the factors responsible for its high degree
instability.

e Casual Factors

We have seen that there is a positive relationship between
icultural GDP and public sector investment growth rates. Why should
se variables be related? One of the possible explanations is that
s relationship operates primarily through the price factor. The rela-
nships involved are illustrated in Fig. 3.

Figure 3

As may be expected, annual rates of change of the price level,
easured by the GDP deflator are negatively correlated (-0.15) with
icultural GDP growth rates. But the PBI price deflator has no corre-
ion with the GDP deflator. Further, the annual changes in the PBI
ator are positively correlated with agricultural GDP growth rates.

It is difficult to explain the relationship between agriculture and the PBI price index.

The annual changes in the real value of public sector investment are the composite of the changes in its nominal value and the changes in its price index. It turns out that while there is a strong positive relationship between the changes in the nominal and real values of public sector investment, the changes in the nominal value appear to be negatively correlated with the changes in agricultural GDP. Further the nominal changes in public sector investment are relatively stable (CV = .64); therefore, the great instability of public sector investment is unlikely to have arisen through the changes in its nominal value. Instead, it is more likely to have resulted from the highly unstable changes in the price index of public sector investment (correlation = -.29). Two types of measures are therefore needed to stabilize public sector investment, one to reduce price fluctuations, especially of food items and the other to reduce the impact of these fluctuations.

We can also study the instability of public sector investment the point of view of its financing, according to the equation for t public sector:

Revenue receipts + Other receipts = Total outlay

= non-investment expenditure + investment expenditure.

The only comprehensive time series (covering both central and state governments) of revenue and other receipts and total outlays are the given in the Economic Survey from 1960/61 onwards; so we have used t

for these variables. However, there is no systematic way in which these total outlays can be split into investment and non-investment expenditures. Therefore, we have taken the investment expenditures as given by the CSO series of GDCF in current prices, and derived the non-investment expenditures. For the present analysis, in order to maintain the validity of the equation, all values were deflated by the GDP deflator. The orders of magnitude of the components of this equation are shown in the following table in 1970/71 prices.

Table: Financing of Public Sector Investment and Development Outlays (Rs.crores at 1970/71 prices)

Item	Average annual values					Averages of annual rate of Growth %
	1960/1-1965/6	1966/7 1970/1	1971/2 1975/6	1976/7-1979/80	1960/61 1979/80	
Revenue receipts	4210	5351	7210	10264	6456	7.08
Other receipts	1850	2074	2626	3720	2474	5.87
Total outlays	6060	7425	9836	13984	8930	6.66
Non-investment exp.	3570	4940	6245	8796	5626	5.25
Investment exp.	2490	2485	3591	5188	3304	6.34
Non-development exp.	2247	3203	4054	5021	3493	7.21
Development exp.	3813	4222	5782	8963	5437	6.62

The degree of instability in these variables (measured by the efficient of variation) and the strength of relationships between owth rates (measured by the correlation coefficient) are illustrated Fig. 4.

Figure 4

We find that revenue receipts, other receipts, and their total are all positvely related to agricultural GDP growth rates with a one year lag (indicated by L), while there is little effect on the changes in non-investment expenditures. All these variables also have considerable instability, though revenue receipts are least so. In turn, all these variable are highly positvely correlated with public sector investment. Therefore, we may conclude that the financial arrangements have been of a fairly constant structure, and have done little to mitigate the influence of agricultural fluctuations on public sector investment.

The concept of public sector investment has generally been recognised as being too narrow in Indian planning discussions. Instead, a more relevant concept in connection with measures to promote growth is that of development outlays. The above table also includes the order of magnitude of the division of total public sector outlays into development and non-development outlays. The relationship of changes in these magnitudes with changes in agricultural GDP and public sector investment are illustrated in Fig. 5.

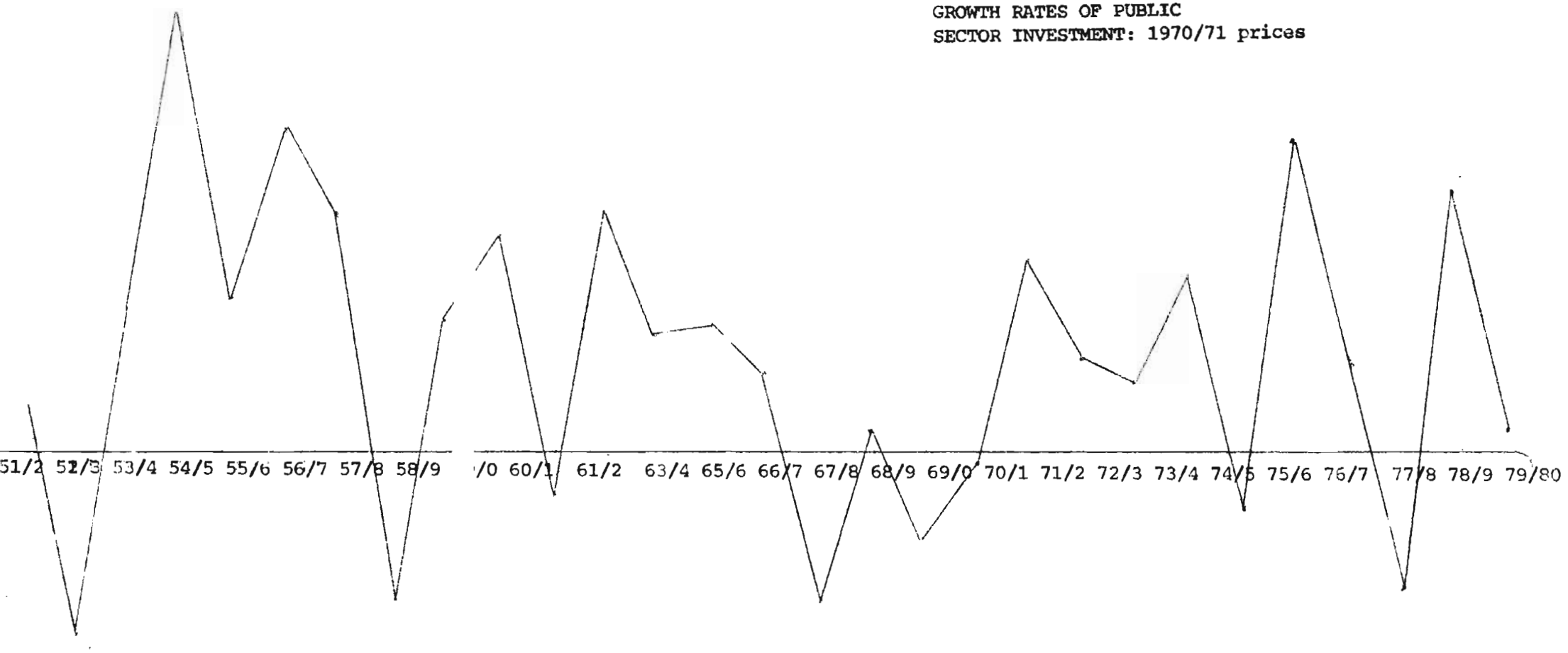
Figure 5

Again we find that changes non-development outlays, like changes in non-investment expenditures, are not highly correlated with agricultural changes. Development outlay changes are highly correlated with agricultural fluctuations, but the relationship may actually operate through total and non-development outlays.

Concluding Remarks

This has been only a preliminary analysis. The tools used are rather primitive. But it may suffice to highlight the high degree of instability of public sector investment and its probable causes and consequences. In order to achieve greater stability of this crucial variable, it is hoped that the present exercise will stimulate others to study the whole problem systematically with more appropriate tools of analysis.

GROWTH RATES OF PUBLIC
SECTOR INVESTMENT: 1970/71 prices



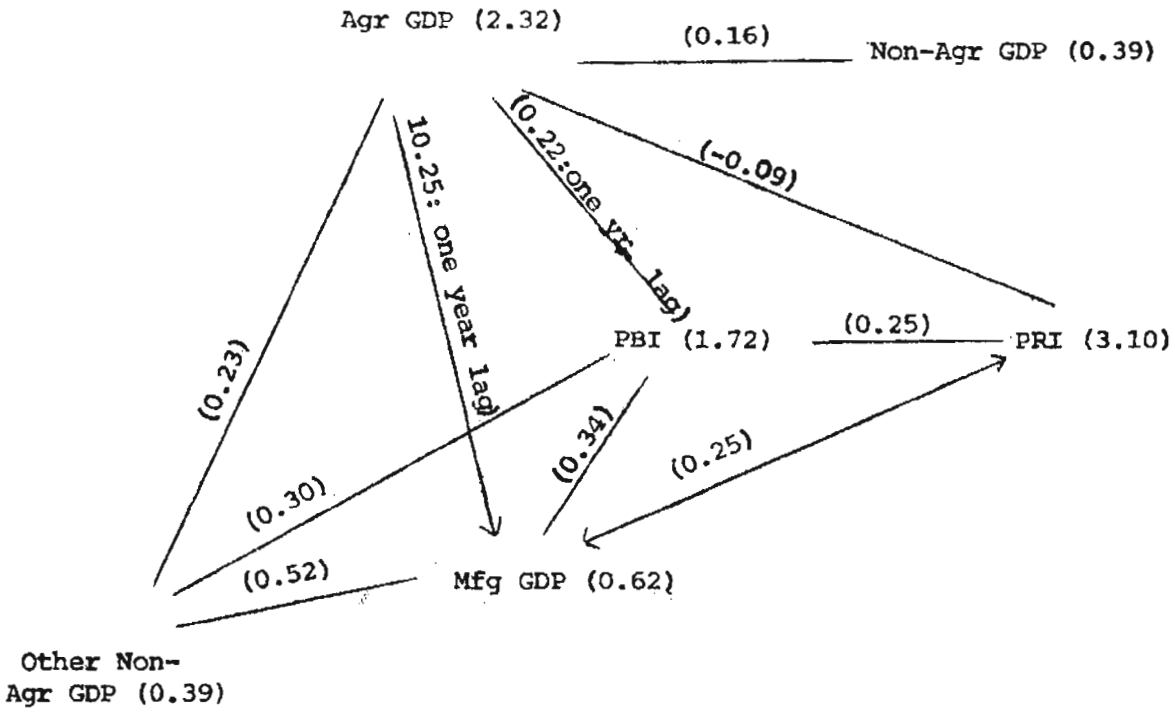


Figure 2

Notes: PBI = public sector investment in real terms

PRI = private sector investment in real terms

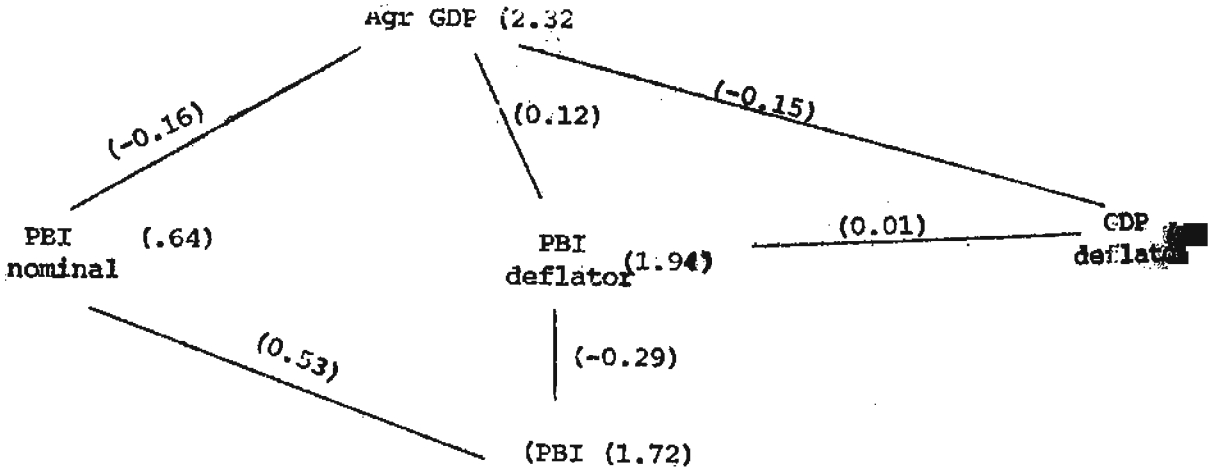

Agr GDP (2.32
(-0.16)
(0.12)
(-0.15)
PBI
nominal
(.64)
PBI
deflator
(1.94)
(0.01)
GDP
(0.53)
(-0.29)
(PBI (1.72)

Figure 3

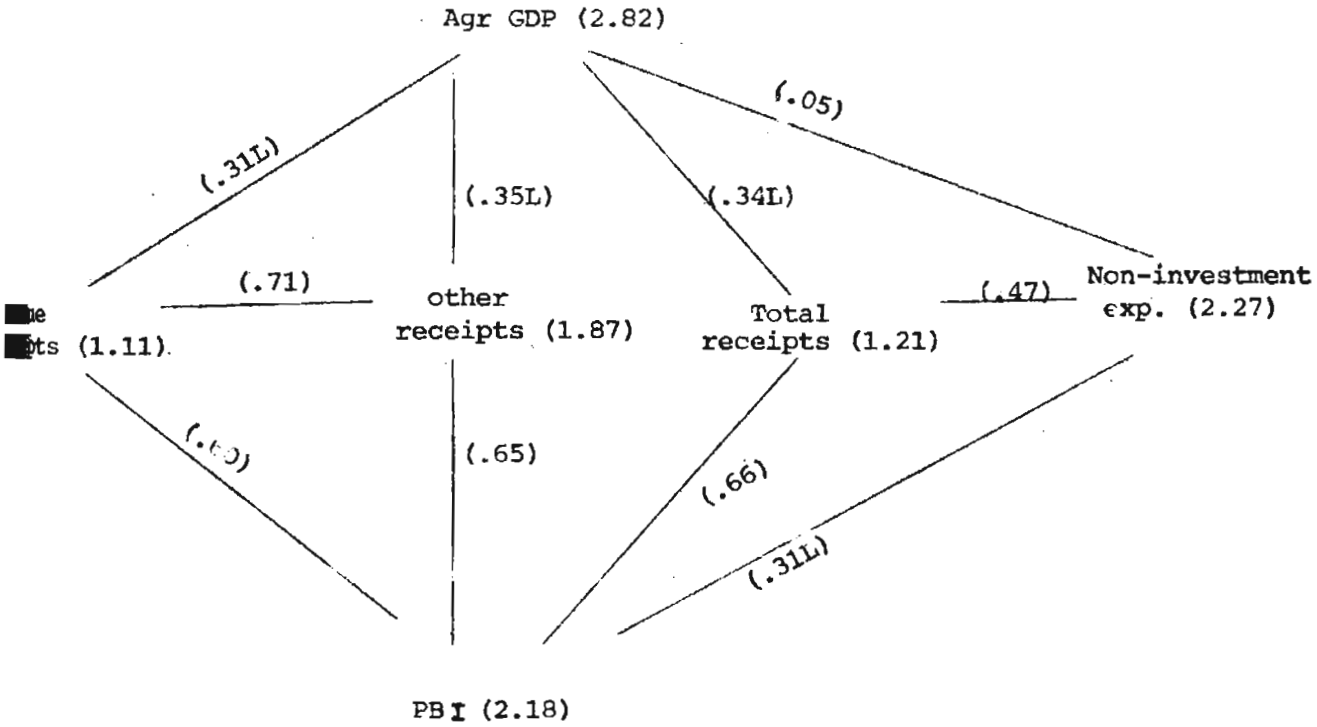
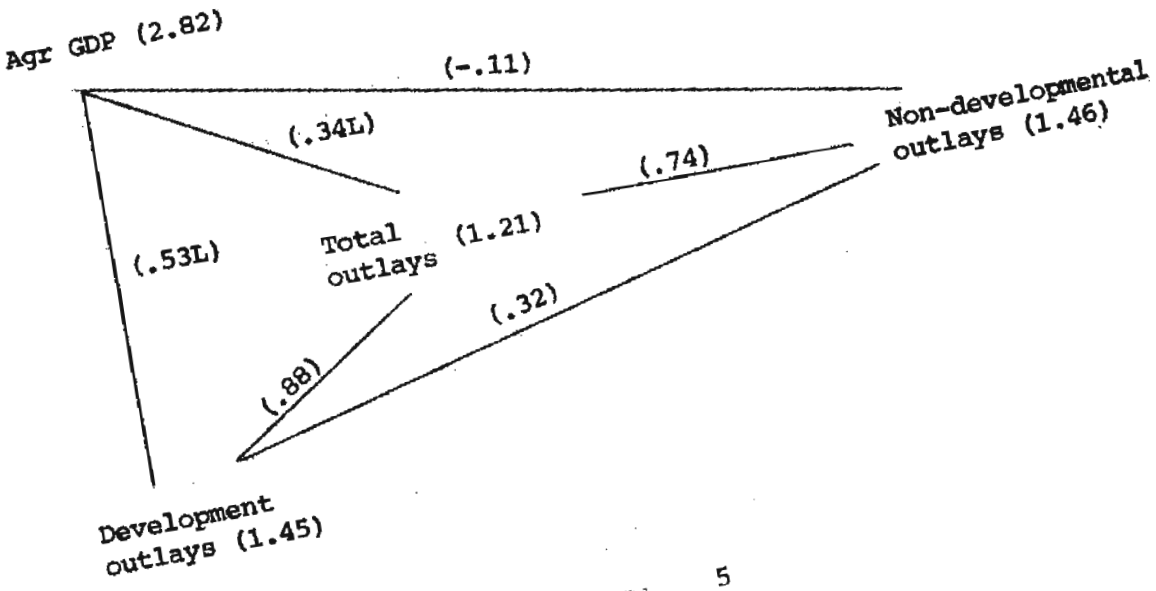

Agr GDP (2.82)
(.31L)
(.35L)
(.34L)
(.05)
(.71)
other
receipts (1.87)
Total
receipts (1.21)
(.47)
Non-investment
exp. (2.27)
(1.11)
(.65)
(.66)
(.31L)
PBI (2.18)

Figure 4


Agr GDP (2.82)
(-.11)
(.34L)
(.74)
Non-developmental outlays (1.46)
(.53L)
Total outlays (1.21)
(.32)
(.88)
Development outlays (1.45)

Figur 5

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