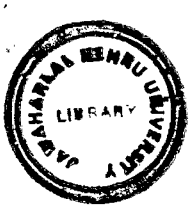
THE DUTCH DISEASE IN DEVELOPING ECONOMIES : THEORY AND EVIDENCE

Dissertation submitted to the Jawaharlal Nehru University
in partial fulfilment of the requirements
for the award of the Degree of
MASTER OF PHILOSOPHY

SHALLEY SHARMA



~~INTERNATIONAL TRADE & DEVELOPMENT DIVISION~~
CENTRE FOR THE STUDY OF DIPLOMACY, INTERNATIONAL
LAW AND ECONOMICS
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UENIVRSTY
NEW DELHI-110 067
1989

जवाहरलाल नेहरु विश्वविद्यालय
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI - 110067

CERTIFICATE

This is to certify that the dissertation entitled " THE DUTCH DISEASE IN DEVELOPING ECONOMIES - THEORY AND EVIDENCE " submitted by Ms Shalley Sharma in fulfillment of six out of a total requirement of twenty-four credits for the Degree of Master of Philosophy of Jawaharlal Nehru University is her work according to the best of my knowledge and may be placed before examiners for evaluation.

R. B. Anand
CHAIRMAN

Ahmad
SUPERVISOR

GRAM : JAYENU TEL. : 667676, 667557 TELEX : 031-73167 JNU IN

ACKNOWLEDGEMENT

I would like to thank my supervisor Dr. Manmohan Lal Agarwal for his guidance and suggestions which were of invaluable help in putting together this study. I would also like to thank Prof. Ashok Guha, Prof. Sandwip Das, Dr. Manoj Pant and Dr. Alokesh Barua for their encouragement and help particularly in the early stages of my M.Phil. I would also like to record my deep debt of gratitude to the Department for very kindly giving me more than adequate time off to complete my dissertation.

On a more personal level, I would like to thank my sister Harshita Sharma for her invaluable assistance in taking over some of the more tedious chores entailed in producing a dissertation. I would also like to thank Mr. Sanjay Jain for typing the manuscript at very short notice.

CONTENTS

CHAPTER I

INTRODUCTION AND SURVEY OF LITERATURE

CHAPTER ONE

INTRODUCTION

In recent years many of the countries experiencing a mineral resource boom have found it to be in the nature of a mixed blessing. Resource booms have been found to pose a threat to the survival of existing export and import competing industries. This experience is commonly referred to as the "Dutch Disease", after it was observed in the Netherlands in the seventies, that the flow of North-Sea gas affected Dutch industry adversly.[1] Subsequently, this phenomenon was observed in many Latin American and Middle Eastern countries which had experienced substantial mineral booms, giving rise to fears that a resource boom may have deindustrialising effects.

A mineral boom increases the real income and wealth of the country, and enables it to attain a higher level of welfare. The exploitation of natural resources on a substantial scale is accompanied by certain structural changes, the most important being

---

1. The earliest printed reference to the Dutch Disease is found in the Economist Nov 26th 1977 in the article "The Dutch Disease".

the decline in the size of the tradeable goods sector. Various theoretical models have been put forward to explain this phenomenon.

The essential Dutch Disease problem is as follows: the advent of a mineral boom raises the real income of the country. This leads to an increase in demand for both tradeables and non-tradeable goods. Assuming a small open economy, the increased demand for tradeables is met via increased imports. The price of tradeables is determined in the world market, whereas the price of non-tradeables is determined in response to domestic demand and supply forces. The incresed demand for non-tradeables (NT) implies that the price of NT goods will be bid up relative to that of T goods, and producers in the NT sector expand production. Given full employment this can only be done by bidding away resources from the T sector. Wages in the T sector increase due to increased NT demand for labour, and hence squeezing profitability in this sector. This is termed the spending effect of a boom. In the long-run with capital mobile across sectors, there will also be a reallocation of capital from the T to the NT sector in response to the greater profitability (higher return on capital) in the NT sector. Therefore even in the

longer period, the mining boom continues to have an adverse effect on the size of the tradeables sector.

From the point of view of optimality of resource allocation, these structural changes may represent an optimal response of production and consumption to the new situation, and there is no presumption that these are harmful. In most developed industrialised countries the manufacturing sector is the dominant tradeable. Contraction of this sector is therefore likely give rise to legitimate grounds for concern, particularly as the boom is not likely to persist indefinitely. The decline in manufacturing is likely to create problems for future growth and adjustment of the economy, particularly if 'learning - by - doing'type of technical progress is important for maintaining competitivy.

The major objective of this study is to examine the effect of a mineral boom on structural change and economic development in developing countries. The study looks at the pattern of structural change for a group of primary oriented developing economies. Most of the countries included in the sample had an important mineral sector. A few countries however had mineral sectors which were very small and these countries were

primarily agricultural exporters. For convenience however, the sample countries are referred to as mineral economies. The main focus is to determine the extent to which the resource allocation processes in these countries have been affected by the Dutch Disease. The period being considered is long enough for lasting structural changes to have taken place.

The study concentrates on the pattern of changes in the two tradeable sectors i.e., agriculture and manufacturing. The manifestation of the Dutch Disease in developing economies would tend to be somewhat different from that observed in developed countries. In countries such as the Netherlands or Great Britain, manufacturing is the most important component of the tradeable sector, and it's contribution to GDP is also fairly high. In these countries the Dutch Disease resulted in the contraction of the manufacturing sector (hence the association of this term with deindustrialisation). However, in most developing countries the manufacturing sector is fairly small and still in the nascent stage. The contribution of this sector in GDP is expected to increase with economic growth and development. The Dutch Disease in these countries may result in a retardation of the process of

industrialisation, rather than in deindustrialisation. Exports of primary products particularly agricultural products are an important source of foreign exchange in developing economies. The Dutch Disease may result in de-agriculturalisation as agriculture is the dominant tradeable sector. This may be reflected by a more rapid decline in the share of this sector than is expected.

The analysis is cross-sectional, and aims to identify broad regularities in the observed pattern of structural change for mineral economies. These patterns are then compared with the pattern of structural change obtained by the Chenery and Syrquin (1975) study for a more general sample of developing countries[2]. Systematic deviations from the average pattern of change for mineral economies are then linked up with various factors such as the size of the mineral sector, the basic development strategy, and the type of foreign trade regime, which are hypothesized to affect the resource allocation processes in these countries differentially.

---

2. Chenery, H. B. and Syrquin, M. "Patterns of Development 1950-1970, Oxford: Oxford University Press, 1975.

The outline of the rest of this chapter is as follows: Section I gives a brief survey of the theoretical literature on the Dutch Disease. This section also presents in some detail a few of the more important models used to analyse the Dutch Disease problem. Section II outlines the structural and institutional characteristics of developing economies with an important mineral sector. Section III presents some broad hypotheses on the impact of a mineral boom in these countries based on both the theoretical literature and the structural and institutional characteristics of the countries. Section IV gives an outline of the basic plan of the subsequent chapters of this study.

SECTION I

SURVEY OF THEORETICAL LITERATURE ON THE DUTCH DISEASE

The Dutch Disease is the name given to the process of stagnation of the industrial sector or deindustrialisation observed in many countries experiencing a mineral boom. Large mineral booms have been associated with certain changes in the structure of the economy. Adjustment to a large mineral sector is also likely to lead to certain macro-economic problems in the shorter-run. Academic researchers have not been

show to subject these problems to scrutiny and a large body of literature is now available dealing with various aspects of the Dutch Disease problem. At the analytical level, existing models from the theories of international trade, open-economy macro-economics and natural resource depletion have been extended to study the resource allocation effects of a mineral boom. At a more applied level, a great many case studies have examined adustment to mineral booms in countries. Booming sector models have also been used to explain historical episodes which have centred around a sectoral boom. For example, Forsyth and Nicholas (1983) have interpreted the effects on Spanish industry of the inflow of American treasure in the sixteenth century.[3]

The analytical framework developed to analyse the Dutch Disease can be applied equally successfuly to examine the resource allocation effects of sectoral booms arising from techincal progress or even favourable external shocks, for example, most of the oil exporting countries experienced large windfall gains after the 1973 oil price hike.

---

3. Forsyth, P. J. and Nicholas, S. J. "The decline of spanish Industry and the Price Revolution: A Neoclassical Analysis in Journal of Economic History, (Winter), vol 12, pp. 601-9.

Most of the theoretical literature in this area has been concerned with two main issues:

(1) the short and medium run resource allocation effects of a booming sector.

(2) the short run macro-economic adjustment issues.

With regard to the first issue, the models essentially focus on structural change. The most basic model in this area is the Corden and Neary (1982) Core model[4]. Subsequent work has extended and refined this analysis, although the basic results regarding the Dutch Disease essentially remain unchanged. Other important papers which concentrate on this aspect are: Gregory (1976), Neary and Purvis (1982), Bruno (1982) and Buiter and Purvis (1982)[5].

---

4. Corden, W. M. and Neary, J.P. (1982) " Booming Sector and Deindustrialisation in a Small Open Economy". Economic Journal vol 92 (December) pp. 825-48.

5. Gregory, R.G. (1976) "Some Implications of the growth of the Mineral Sector". Australian Journal of Agricultural Economics, vol 20 (August), pp. 71-91.

Bruno, M. Adjustment and Structural Change under Supply Shocks. Scandinavian Journal of Economics. vol 84, pp. 199-221. (1982)

Neary, J. P. and Purvis, D.D., "Sectoral Shocks in a Dependent Economy: Long-run Adjustment and Short-run accommodation". The Scandinavian Journal of Economics vol 84, 1982 pp. 129-223.

Buiter, W.H. and Purvis, D.D. (1982) "Oil Disinflation and Export Competitiveness: A Model of the Dutch Disease", in Bhandari, J. and Putnam, P.(eds.), Economic Interdependence and Flexible Exchange Rates. (Cambridge, Mass.-MIT Press.)

The models focusing on short-run adjustment issues examine mechanisms via which a mineral boom can also lead to disequilibrium phenomenon such as unemployment or inflation during the process of structural adjustment to a boom. The monetary implications of a resource boom are also likely to be of importance in the short-run, though as the boom is a real shock to the economy, the long -run equilibrium is independent of nominal magnitudes.

The survey first examines various modelling approaches dealing with structural change, although the two aspects of the boom are interrelated, as short-run macroeconomic problems for example, unemployment make their appearance once some of the restrictive assumptions of the models focussing on structural change are relaxed. To highlight the structural aspects of the boom, the Corden and Neary framework abstracts from monetary factors and concentrates on adjustment in real variables. The model also assumes that there are no distortions in commodity or factor markets, in particular real wages are perfectly flexible ensuring that full employment is maintained at all times. Short-run adjustment problems may arise due to departures from these assumptions. For example, Neary and Purvis

(1982) consider the case where the price of services adjusts sluggishly and this is seen to generate unemployment during the period of adjustment. Van Wijnbergen (1984a)[6] examines the case of real wage indexation. Unemployment may emerge if the rise is prices of non-traded goods requires a fall in the workers real wages, but because of indexation real wages are downwardly sticky.

The Corden and Neary model allows for differing degrees of intersectoral mobility of factors. Thus, for example, labour is assumed to be perfectly mobile across all sectors in the short-run, whereas capital (or the fixed factor) is assumed to be mobile only in the longer period. Various assumptions on the extent of intersectoral mobility of capital are considered and these lead to the generation of different scenarios. The basic result of the Dutch Disease i.e., a declining tradeable sector and a real appreciation are found to hold in the short-run. In the longer period with capital mobility, a variety of scenario's based both on differing degrees of capital mobility and relative capital intensities of the sectors can be constructed.

---

6. Van Wijnbergen, S. (1984a) "Inflation Employment and the Dutch Disease in Oil - Exporting Countries: A Short-run Disequilibrium analysis". Quarterly Journal of Economics vol 99. pp. 233-50.

The Dutch Disease outcome of a contracting tradeable sector and a real appreciation are not found to be inevitable in the long-run.

The short-run Corden and Neary model analyses the impact of a boom in terms of both the spending effect arising from the increased real income, and the resource movement effect due to the increase in demand for labour by the booming sector, if it shares factors in common with other sectors in the economy. However, given the highly capital intensive nature of most mining activities, it is unlikely that the increased demand for labour will create serious labour market pressures. Many of the Dutch Disease models assume the mineral sector to be an enclave, and examine the effect of the spending effect only. The increase in income due to the boom is modelled as a transfer to the ecomomy. This scenario is fairly consistent with the experience of the oil exporting countries after the 1973 oil price hike. Van Wijnbegen (1984a) uses this stylisation.

As noted earlier, the Corden and Neary model assumes perfect real wage flexibility. The real product wages in both tradeables and non-tradeables sectors adjust flexibly to maintain full employment. Once real wage fixity, is allowed for the short-run macro

economic consequences of a mineral boom are less clear cut. Van Wijnbergen (1984a) presents an interesting model, analysing the effects of a mineral boom in a Malinvaud type disequilibrium model with Phillips curve type wage-price dynamics. He uses this framework on the grounds, that many countries experiencing a mineral boom have been faced with persistent unemployment or inflationary pressures. These are clearly not an equilibrium phenomenon. The model therefore allows for the existence of disequilibrium in the labour and non tradeables market. Real wage rigidity is introduced by indexation of wages to the consumers price index (CPI). The CPI itself is a weighted combination of tradeable and non-tradeable prices with the weights being their respective shares in the consumers basket.

The advent of a boom leads to a real appreciation which given prices of tradeables and the real wage implies a higher real wage in terms of tradeable goods and a lower real wage in terms of non-tradeable goods. The increase in tradeable wages causes labour to be shed from this sector. The important point here is whether the non-tradeable real wage falls sufficiently to absorb these workers in the non-tradeable sector. A crucial determinant of this is the relative importance of tradeables versus non-tradeables in the CPI. If

traded goods are dominant in the consumption basket then for a given increase in price of non-tradeables, the increase in wages via indexation is relatively small. In this case there will be a greater fall in the non-tradeable sector product wage and hence a large increase in demand for labour by this sector. According to Wijnbergen this scenario fits the situation of excess demand for labour and inflationary pressures faced by many of the Gulf countries. These countries have a high component of imported goods in their consumption basket.

If traded goods account for a relatively low proportion of consumption, the opposite situation prevails. For example, many of the Latin American countries with long histories of import substitution and trade barriers typify this scenario. A given increase in the price of non-tradeables is transmitted into relatively large increases in tradeable sector wages, whereas the non-traded product wage does not fall sufficiently to absorb the labour released by the traded sector. In this case, the mineral boom leads to unemployment.

Thus far, the various models have ignored monetary considerations. Although the long-run equilibrium is

independent of monetary factors, these nevertheless have important effects in the short-run[7].

Within the context of the Dutch Disease models, the introduction of monetary variables implies we are now interested in the nominal price level as well as relative prices. The basic effect of monetary factors is to introduce a liquidity effect of the boom. The increase in real income also leads to increased demand for real balances. If money supply is assumed to be given, this will have a deflationary effect.

The manifestation of the effects of the boom will differ according to the exchange rate regime. Under flexible exchange rates, the advent of a boom leads to a sharp nominal appreciation so that the domestic price of traded goods falls. This is the mechanism via which the shift to non-tradeables is accomplished. In the case of a fixed exchange rate regime, the immediate effect of a mineral boom is to create excess demand pressures in the non-traded market. This leads to an increase in the nominal price of non-tradeables.

---

7. See for example Neary J.P and Van Wijnbergen,S. Survey article the monetary effects of a boom in Neary, J. P. and Van Wijnbergen, S. (eds.) Natural Resources and the Macroeconomy. Basil Blackwell (1985).

However, the extent of the short run real appreciation is less than that required in the long run equilibrium, as the spending effect in partly dampened by the leakage into hoarding which is reflected in a BOP surplus. Over time, the trade surplus leads to a build up of foreign exchange reserves and provided the authorities do not neutralize this inflow, the nominal price level of non-tradables increases.

Thus, fixed exchange rate regimes tend to be more inflationary and delay the real effects of the boom. To the extent that it is desirable to avoid inflationary pressures, a policy of allowing some degree of nominal appreciation may be preferable. In the long-run, the extent of the real appreciation is independent of the type of exchange rate regime and depends only on real factors.

So far, these models have ignored the case where the mineral export is also consumed domestically as an intermediate. The most obvious example of this is the energy sector. Bruno (1982) examines the impact of an increase in energy price when it is also an important intermediate input. Such a price increase would tend to shift resources away from the energy intensive sectors. To the extent that the manufacturing sector

is intensive in the use of energy, this effect will work to reinforce the deindustrialising effects of the spending effect.

They also distinguish between the short-run and long-run effects of an increase in energy price. In the short-run, only the variable factor for example labour is free to more. However relative changes in profitability may give rise to inducements to change the pattern of capital investment. Whether the latter actually takes place is seen to depend upon the extent to which the energy price is perceived to be temporary or permanent.

Another strand of the litrature in this area examines the Dutch Disease problem in a intertemporal framework, as it was felt that many aspects of the Dutch Disease could not be satisfactorily examined in a static context --- for example, issues arising from the finiteness of the mineral reserves, or the presence of 'learning-by-doing' externalities in manufacturing require a dynamic perspective. Van Wijnbergen (1984b) has developed a two period intertemporal optimisation model[8]. In the case with

---

8. Van Wijnbergen, S. (1984b) "The Dutch Disease, : A Disease after all ?" Economic Journal vol 94 pp. 41-55.

is intensive in the use of energy, this effect will work to reinforce the deindustrialising effects of the spending effect.

They also distinguish between the short-run and long-run effects of an increase in energy price. In the short-run, only the variable factor for example labour is free to more. However relative changes in profitability may give rise to inducements to change the pattern of capital investment. Whether the latter actually takes place is seen to depend upon the extent to which the energy price is perceived to be temporary or permanent.

Another strand of the litrature in this area examines the Dutch Disease problem in a intertemporal framework, as it was felt that many aspects of the Dutch Disease could not be satisfactorily examined in a static context --- for example, issues arising from the finiteness of the mineral reserves, or the presence of 'learning-by-doing' externalities in manufacturing require a dynamic perspective. Van Wijnbergen (1984b) has developed a two period intertemporal optimisation model[8]. In the case with

---

8. Van Wijnbergen, S. (1984b) "The Dutch Disease, : A Disease after all ?" Economic Journal vol 94 pp. 41-55.

identical tastes and technology in the two periods, with perfect foresight, and perfect capital markets, the mineral boom is found to have same effect on demand in the two periods, the only difference between the periods follows from the assumption that capital stocks can be optimally adjusted in the second period only. This leads to a larger supply response of the non-traded goods sector in the second period, and hence the extent of the future appreciation is smaller then that in the current period. In the first period there is overshooting of th exchange rate.

These results are completely independent of the time pattern of mineral revenues because of the assumption that capital markets are perfect, so that any excess of current revenues over the permanent income equivalent is used to accumulate foreign assets. The real appreciation is therefore an efficient response to effect the necessary reallocation of factors from the tradeable to the non-tradeable sectors to accomodate the boom.

If 'learning-by-doing' type of technical progress is an important element in maintaining future competitivy of manufacturing, the decline of this sector during the boom period will harm the economy's

future growth prospects. The existence of such technical progress represents a case for a subsidy to manufacturing even in the absence of the boom. With advent of the boom , Wijnbergen finds a strong case for an increase in the optimal subsidy to this sector.

Thus far, this section has surveyed some of the major developments in this area. We now turn to examine in greater detail the models which are of relevance to the study, and help generate basic hypotheses regarding the effect of a mineral boom in developing economies. As the primary focus of the study is on structural change in the long-run, we now examine in detail models which focus on the long-term effects on resource allocation of a boom. The most useful model frameworks for this purpose were the Corden and Neary model with capital mobility, and the Neary and Purvis (1982) model. Both models concentrate on real factors and in some ways are rather similar. However, the Neary and Purvis (1982) model provides a better integration of the short and long-run consequences of a resource boom, and therefore gives greater insight into the dynamics of adjustments to a resource boom.

The remainder of this section is as follows; first the simple short-run version of the Core model is

presented briefly. The longer-run extension of the model is given next. Following this is given the Neary and Purvis models. Finally some extensions of the Core model which are relevant for developing economies.

The Short-run Core Model

The basic short-run model adopts a three sector framework. These are the energy sector (E) which experiences a boom, a tradeable goods sector (M) which is assumed to be manufacturing, and a non-tradeable sector (S) producing services. The first two sectors produce tradeables and face given world prices. Output in each sector in produced by a factor specific to it (capital) in the short-run and labour (L) which is freely mobile between sectors. Measured in terms of M sector output, the wage is W and returns to the specific factors are R_E, R_M, R_s. All factor prices are flexible.

The diagram in fig.2 illustrates the essential adjustment problem. AB represents the production frontier for tradeables and non-tradeables given available factor supplies. Corden takes the boom to result from Hicks neutral technical progress in the E sector which raises the maximum feasible output of tradeables while leaving the output of the S sector

unchanged. The new frontier is DB. OZ depicts a consumption locus. At constant distribution of income the relative price of tradeables to non-tradeables is given by the slope of the tangent at Mo No.

Fig. I illustrates the labour market equilibrium. The wages in terms of M sector output are measured on the vertical axis, and the economy's total labour supply is given by Os Ot. Given the assumptions of the model, the demand for labour in each sector is decreasing function of the wage rate relative to the price of that sectors output. The respective labour demand, schedules are Ls, Lm, and Le. The location of the Ls schedule depends on the initial price which is not exogenous but is determined as part of the complete general equilibrium of the model.

Corden and Neary examine the two effects of the boom. The advent of a boom in the E sector raises the real income of the country. This increases demand for both tradeables and non-tradeables. Assuming an open economy, the increased demand for tradeables is met via increased imports, but the excess demand for services requires that Ps increase relative to Pt. This is equivalent to a real appreciation and increases profitability in the S sector and therefore it's demand

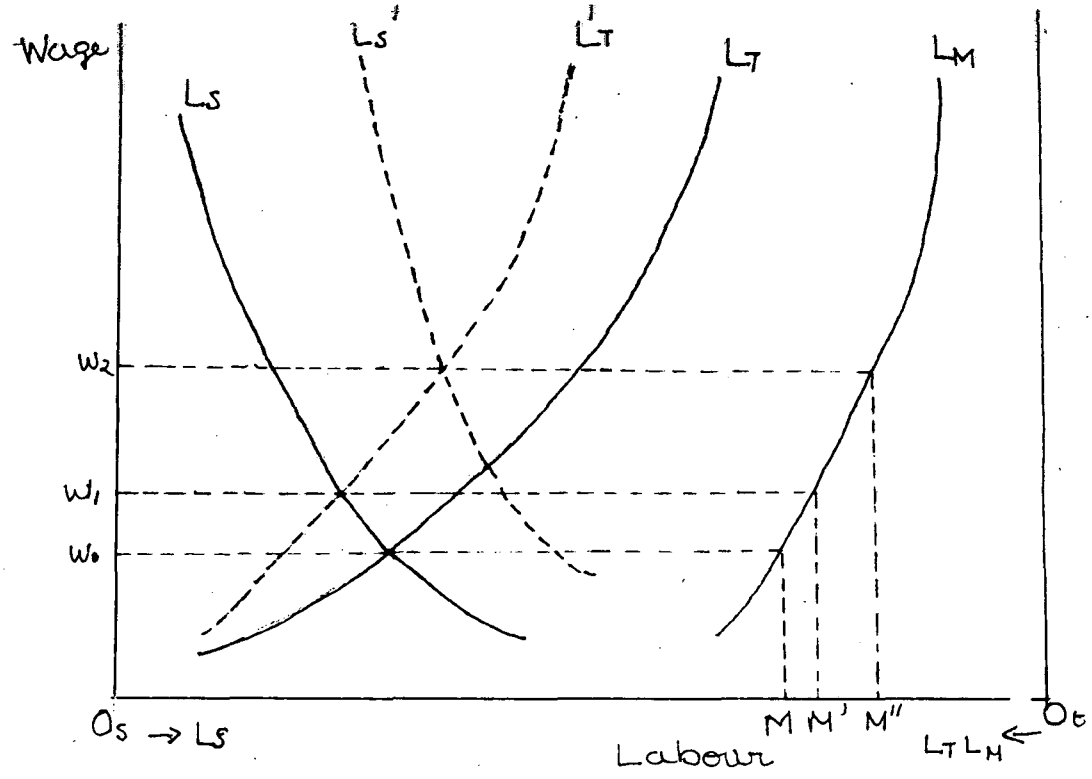


Fig.1. Effect of the Boom on the Labour Market

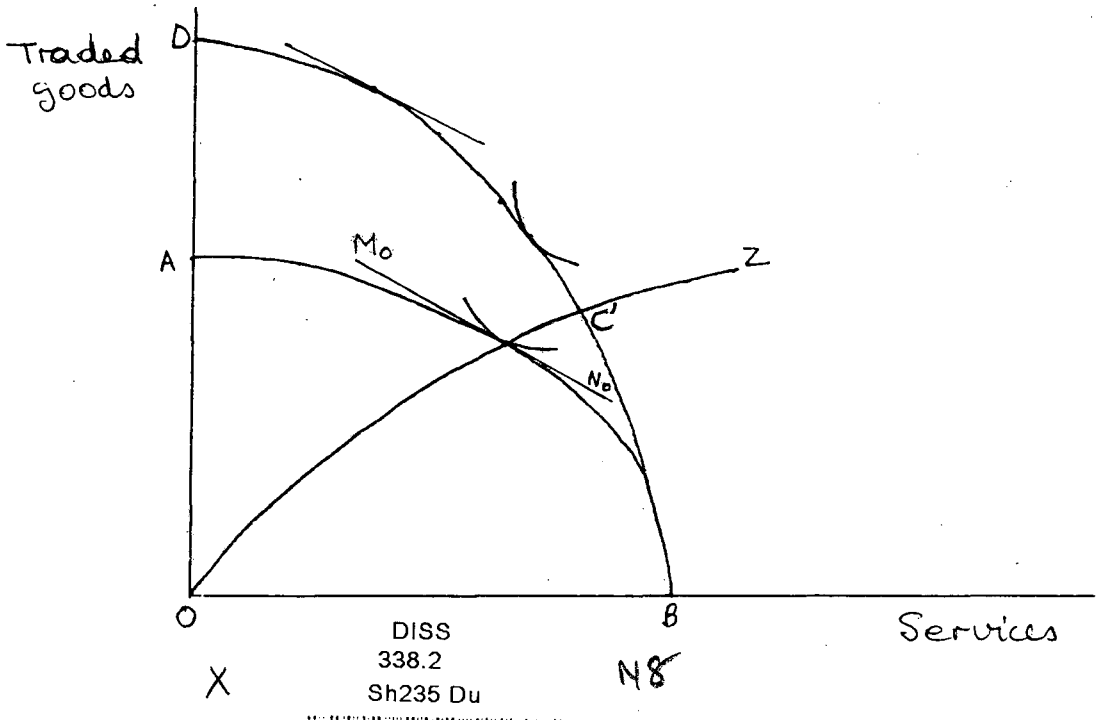


Fig. 2. Effect of the boom on the Commodity Market

for labour. The spending effect of the boom leads to a movement of labour out of the M and E sectors to the S sector. The increased demand for labour by the sector increases wages and this will squeeze profitability in the M sector. Thus in the short-run, M sector output and employment contract.

In terms of Fig.2, as long as services are normal, demand moves along OZ to C'. At the initial exchange rate there is excess demand for services and therefore Ps rises. If the E sector is of the enclave type the main effects of the real appreciation are felt by the M sector.

In the Corden and Neary model, the resource movement effect is only possible if the E sector utilises labour. The result of a boom would be to increase E sector demand for labour. This induces a movement of labour out of both the M and S sector. The fall in S sector output would create a tendency for a real appreciation.

In sum, both effects work to decrease output and employment in the M sector in the short-run i.e. the Dutch Disease and the real exchange rate appreciates. The impact on the output of the S sector is less clear

cut. However as long as the spending effect dominates (which is more likely given the highly capital intensive nature of mining activities) output and employment in this sector would increase.

The impact of the boom on the returns to the specific factors may be interpreted as a measure of the impact on profitability. From the point of view of resource allocation in the longer-run, it is changes in relative profitability which are important. Both effects work to lower rents in the M sector. Profitability in the S sector would tend to rise if there was only the spending effect. Corden and Neary also consider a medium run model with capital mobile between sectors.

MODEL WITH CAPITAL MOBILITY

The specification of the medium-run model is similar to the short-run model except that the model now allows for capital mobility. The E sector is assumed to use a specific factor and capital. Given the highly capital intensive nature of mining activities in most countries, this is a valid stylisation. Thus capital is mobile across all three sectors, and labour

can move between the M and S Sectors[9]. The M and S sectors are assumed to use both labour and capital. These two sectors can be regarded as comprising a mini Hecksher-Ohlin economy with variable supply of capital equal to the total endowment of K minus the amount used in the E sector. Assuming constant returns to scale and non-specialisation there is a unique relationship between wage and Ps (both measured in terms of the traded goods), which depends only on technology in the two sectors and is therefore unaffected by the boom. The relationship between W and Ps is drawn in the left hand panel of Fig.3 as an upward sloping curve reflecting the assumption that the M sector is more K intensive relative to the S sector. In the right hand panel are drawn the supply and demand curves for

---

9. Corden and Neary (1982) use a somewhat different specification, they assume that theSSector uses a specific factor and labour. Thus here labour is mobile accross all three sectors, whereas capital can only move between the M and S sector. The specification used is more in keeping with the highly capital intensive nature of mining activities in most developing economies.

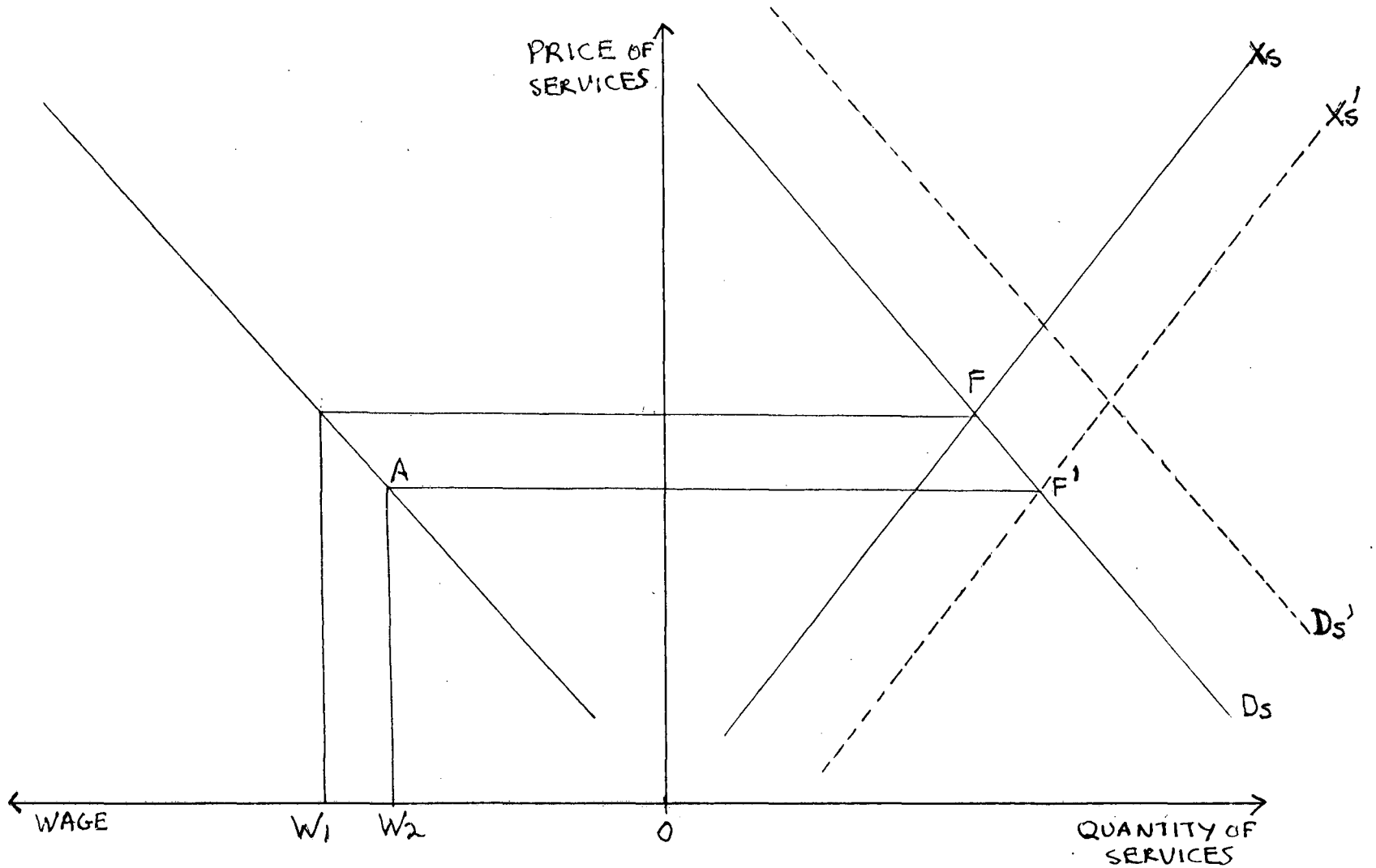


Fig. 3. Effects of the boom when Capital is Mobile

services.[10]

They first consider the resource movement effect of the boom separately by assuming that the income elasticity of demand for services is zero. This eliminates the spending effect of the boom, and so ensures that Ds does not shift. The initial effect of the boom is to increase profitability in the E sector. With capital mobility there will be a reallocation of K from the M and S sector to the E sector. This reduces the available supply of K for the M and S sectors. The effect of this on output, follows from a straight forward application of the Rybcyznski theorem; at constant prices, the ouput of the labour intensive sector will increase and that of the K intensive sector will decline. This is shown by a rightward shift of the Xs schedule to Xs' in Fig.3. The S sector equilibrium moves to F ' and output increases. There is also a fall in wages W and Ps. Thus the resource movement effect in

---

10. Corden and Neary interpret the supply and demand schedules as general equilibrium curves rather than partial equilibrium curves. Thus Xs is the outcome of both the reallocation of resources between manufacturing and services and the movement of K between these two sectors and the E sector in response to a change in the relative price of services. This curve is upward sloping, reflecting the fact that the supply response is normal. Similarly, the demand curve Ds is drawn on the assumption that the expenditure is always equal to income, where income is determined by the production possibility curve for any given price.

the medium run also has a deindustrialising effect, but is accompanied by a real depreciation.

The spending effect of the boom increases demand for services and therefore shifts the Ds curve outwards to Ds'. The effect of this is to unambiguously raise the price and output of the S sector and therefore squeeze manufacturing output, irrespective of the relative factor intensities of the two sectors.

The combined effect of both these effects is to squeeze manufacturing output, and hence there is a tendency towards deindustrialisation of the M sector even in the long-run. S sector output will unambiguously increase in the long-run but the effect on the real exchange rate is not clear cut. The spending effect of the boom creates a tendency for a real appreciation, whereas the resource movement effect creates a tendency towards a real depreciation. A tendency towards an appreciation is more likely the stronger is the spending effect.

Neary and Purvis Model

Neary and Purvis have put forward a model of the Dutch Disease which is very similar in its broad specification to the model specified above. Again their

model is essentially concerned with the effect on long-run structrural change of a boom. The short-run resource movement effect to the mineral sector is abstracted from their analysis. This is because very few resource booms have been associated with a significant movement of labour to the energy sector. The three sector framework is retained, though the technological specification of these sectors have been somewhat modified. The S sector is assumed to use only labour, reflecting the highly labour intensive nature of most service sector activities. The E sector uses K and a fixed factor specific to it. Only the M sector uses both K and L. Labour is freely mobile between the M and S sectors in the short-run. On the other hand K is mobile between the E and M sectors in the longer-run. The other assumptions made by Neary and Purvis are broadly similar to that of the Corden and Neary model. However, this model works out more explicity the implications of intersectoral mobility of capital in the long-run Equilibrium.

The analysis is essentially Carried out in terms of the of the labour and capital markets. By suitable choice of units, the input-oiutput coefficient of labour is set equal to unity., As labour is the only input in the service sector, this implies that Ps=W. Thus in this

model the real exchange rate defined as Π = Pt/Ps and is essentially the inverse of the real manufacturing wage.

The labour market equilibrium locus is the combination of the real exchange rate (Π) and the sectoral allocation of capital (Km) consistent with labour market equilibrium. The mechanism is as follows : an increase in (Π) implies a fall in the real manufacturing wage. Thus there is an increase in demand for labour by the M sector. To maintain equilibrium this requires a reduction in the K stock in the M sector. At a given wage rate a decline in the K stock is required to reduce the demand for labour. Thus the labour market schedule is negatively sloped.

With regard to the K market, the K stocks in the E and M sectors adjust so as to equalise their rates of return. An increase in Π increases profitability in the M sector, and so also raises the return to K in this sector. In the longrun there will be a movement of K out of the E sector to the M sector. Thus the K K schedule is positively sloped. The equilibrium in the two markets is shown in Figure 4.

The impact of a resource boom is examined within this framework. The increase in real income increases demand for services. This implies demand for labour by this sector also rises. At a given exchange rate and factor proportions this is achieved by a reduction in Km. The LL locus therefore shifts downwards.

The boom also increases the rate of return to the K in the E sector. At given exchange rates, the K market equilibrium requires the reallocation of K from the M to E sector. The KK locus also shifts to the left. This reflects the resource movement effect of the boom and is a long-run phenomenon. The effect of the boom is shown in Fig.5.

In the short-run, with K fixed, the equilibrium moves to B on the LL' Locus as L market equilibrium is maintained continuously. The immediate effect of a boom is to result in a sharp real appreciation. This is equivalent to an increase in the real manufacturing wage and this therefore decreases demand for labour by the M sector. In the short-run labour moves from the M sector to the S sector. Thus the Neary and Purvis model also shows the usual Dutch Disease of a sharp decrease in the profitability of the M sector.

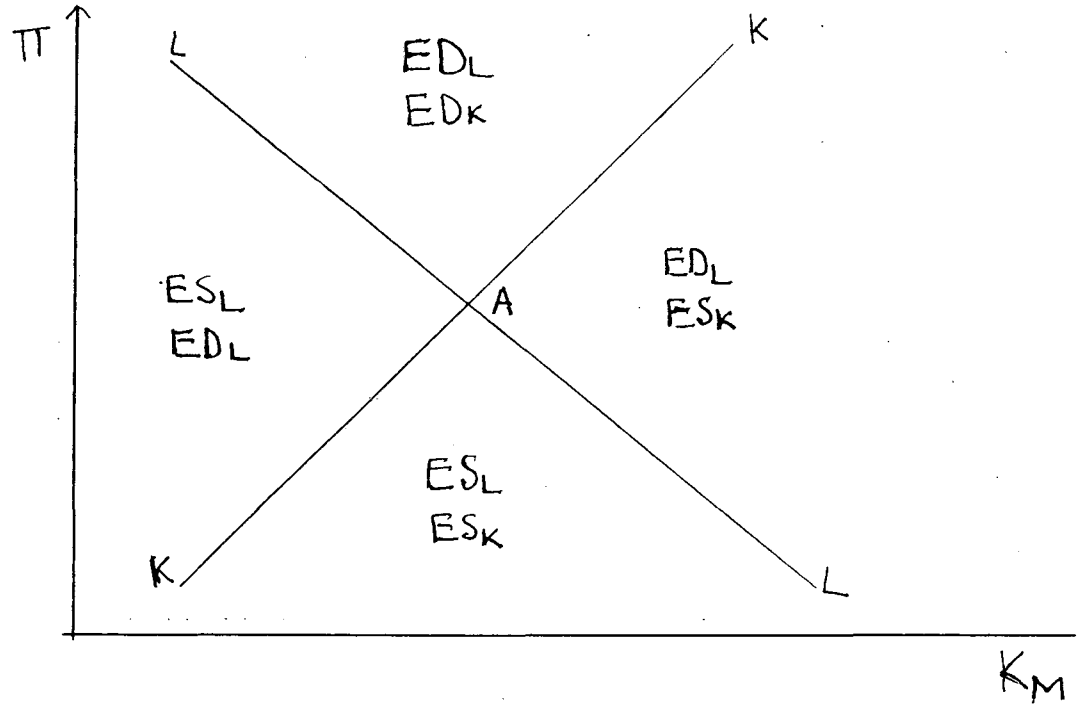


Fig.4 Factor Market equilibrium

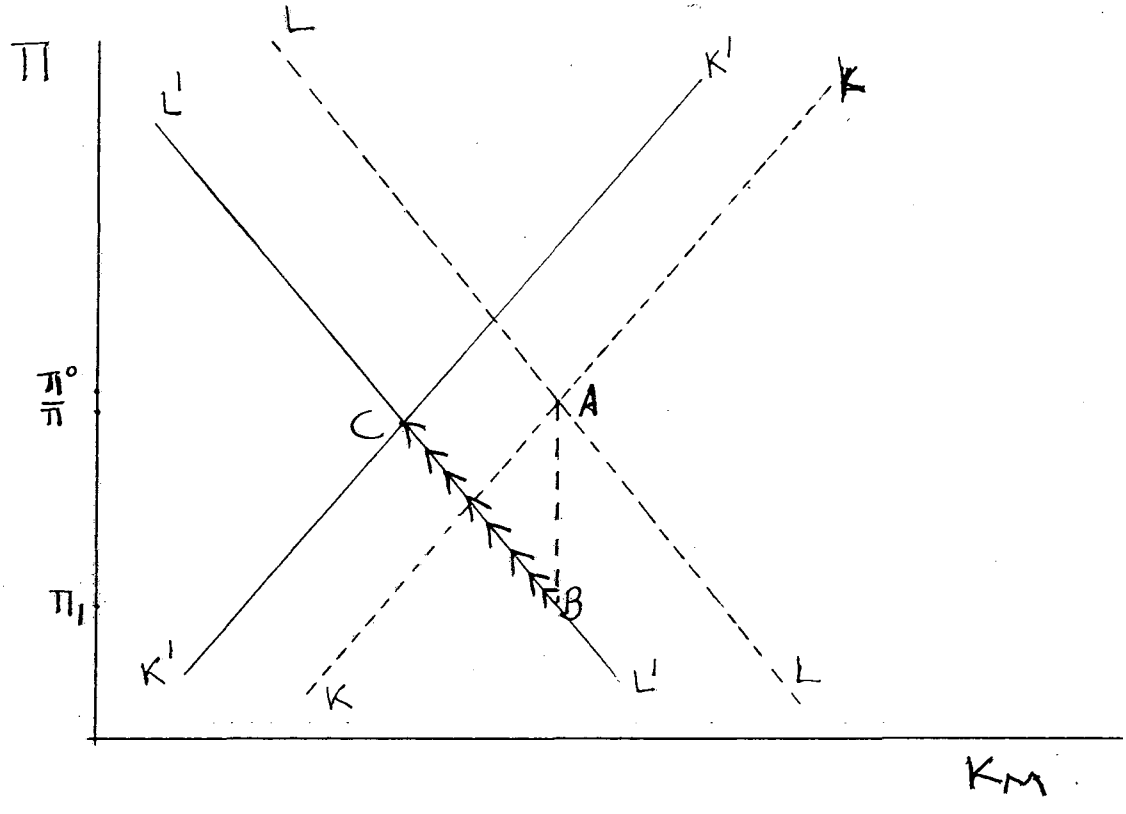


Fig. 5. The Effects of a mineral boom.

The movement of labour out of this sector causes the capital labour ratio to rise and the return on capital to fall. They postulate a simple mechanism whereby the K stock in manufacturing adjusts over time in response to the difference in rentals earned by K in the two sectors i.e.

$$\dot{K}_m = \phi(R_e/R_m) \quad \phi(1) = 0 \quad \phi' > 0$$

Overtime there is a steady reallocation of capital to the E sector. As the labour market clears continuously, the economy follows a monotonic path along the L'L' schedule marked by the arrows in fig.5. The process of long-run adjustment is also accompanied by a steady tendency to depreciate.

This model again is ambiguous about the real exchange rate. There will be a tendency towards a real appreciation as long as the spending effect is dominant. The resource movement effect leads to a tendency for the real exchange rate to depreciate, because of the increase in the supply of non-tradeables output, which has a moderating effect on the excess demand pressures generated by the spending effect.

Again this model predicts a tendency for the manufacturing sector to contract both in the short and

longrun. The model highlights the tendency for short-run overshooting of the real exchange rate. This occurs because with K stock fixed, the brunt of adjustment to the spending effect of the boom is borne by changes in the relative prices. The model emphasizes the reallocation of K in response to differences in rates of return in the long-run. These results are by and large similar to those obtained by the Corden and Neary model, but this model examines the process of long-run adjustment to a boom more explicitly.

Extensions of the Dutch Disease Theory to Developing Economies

We now examine certain extensions of the Dutch Disease model in the context of developing economies. For analytical convenience, the boom can be modelled as a transfer to the economy. This implies that there will be no resource movement effect to the mineral sector in the short or long-run. The large scale nature of the investment in mining has meant that in most developing economies this sector has been developed either by direct investment by Government, or by foreign capital. Thus even in the long-run, private investment in this sector is not likely to be very

important. Even if the boom a modelled as a transfer to the economy, the basic Dutch Disease conclusions continue to be valid. The spending effect of the boom leads to a real appreciation, and thus both in the short and long-run resources are reallocated away from the M sector to the S sector. As long as the spending effect is dominant there would be a tendency for a real appreciation in the longer-run.

The conclusions of this stylisation are broadly similar to those obtained earlier : a contracting M sector both in the short run and long-run. This is a simpler stylisation of the Dutch Disease problem and most of the subsequent work in the study makes use of this specification.

In most developing countries the tradeables sector includes both manufacturing and agriculture, apart from the mineral sector. Infact in a large number of developing countries the agricultural sector is likely to be the dominant tradeable sector apart from the mineral sector. Corden (1984)[11] suggests another extension of the core model would be to decompose the

---

11. Corden (1984) "Booming Sector and Dutch Disease Economic Survey and Consolidation" Oxford Economic Papers vol 36, pp. 351- 60.

tradeable sector into two sub-sectors : agriculture and manufacturing. Both sectors are assumed to use capital and labour in different proportions, although in general manufacturing is more capital intensive. The S sector is assumed to use only labour and the boom is modelled as a transfer. The tradeable sector therefore makes up a mini Heckscher - Ohlin economy with variable supply of labour. The advent of a boom would lead to the usual movement of labour from the tradeable to the S sector. Within the tradeable sector the total available supply of labour falls with a given capital stock. At constant prices it follows from the Rybczynski (1955) theorem that the output of the labour intensive sector (agriculture) contracts and that the manufacturing sector increases. The tradeable sector as a whole contracts, and the non-traded sector expands. This stylisation therefore suggests that agriculture is worse affected by the boom than the manufacturing sector. In most developing countries, the service sector (which is a major component of the non-tradeable sector) is highly labour intensive. A study by Nankani (1979) for a group of developing economies with important mineral sectors found that the agricultural sector was performing poorly as compared

to non-mineral developing economies[12]. Acute labour shortages have been identified as a major cause of the poor agricultural performance in Jamaica, Trinidad and Tabago, Guyana and Congo.

Finally, it should be noted that if some parts of the tradeable sector are subject to binding quantitative restrictions, then for these parts domestic prices are effectively determined by domestic demand and supply. These can be regarded as non-tradeable and are likely to be net beneficiaries of the spending effect.

This is an important modification for developing countries most of which have followed policies of import substitute industrialization. The import competing section of the manufacturing sector is highly protected both by high tariffs and quantitative restrictions. The existence of such a highly protected sector is likely to exacerbate the negative effects on the export sector. Exports are likely to be hit twice : first by the real appreciation (which is likely to be greater than before) as well as the direct resource loss to the import competing sector as the spending

---

12. Nankani, G. (1979) The Development Problems of Mineral Exporting Countries. World Bank Staff Working Paper No. 354.

effect may raise profitability in the import competing sector and this will attract both labour and capital from the export sector.

Policy Responses of the Government

The sharp erosion in competiveness of the tradeable sector will generate strong pressure for protection of this sector from the adverse effects of the real appreciation. Devaluation of the currency is likely to be one of the policies advocated for this purpose. In the post boom situation a devaluation raises the price of tradeable. However, Enders and Herberg (1983)[13] find that the real effects of a devaluation are likely to be transitory and the only lasting effects are increases in nominal prices and wages. Peter Warr in a study of the impact of the oil sector on the Indonesian economy, finds that the 1978 devaluation of the Rupiah restored profitability in the traded goods sector, but that the relative price effects of the devaluation were dissipated over a period of two years.[14] Both theory as well as the

---

13. Enders, K and Herberg, H. "The Dutch Disease, Causes, Consequences, cures and calmatives." Welwirtschaftliches Archiv vol 119, 3 pp. 473-97.

14. Warr, P. (1985) "Indonesia's other Dutch Disease: Economic effects of a Petroleum Boom", in Neary J.P. and Van Wijnbergen, S. (eds). Natural Resources and the Macroeconomy. Basil Blackwell.

actual experience of countries suggests that devaluation of the currency is at best a temporary measure.

Another policy to protect the tradeables sector is to avoid the real appreciation. This canbe done by the monetary authorities neutralising the inflow of foreign exchange. This would suppress the real appreciation and therefore protect the tradeable sector. The cost of this policy arises from continuing shortfalls of aggregate consumption below the new level of national income which would be reflected in an ongoing BOP surplus[15].

The other policy often resorted is to increase the level of protections by increasing tariffs and tightening quotas. As already noted, this policy benefits the import competing sector at the expenese of exportables. Corden, (1984) suggests that the first best policy would be to grant direct subsidies to the output of the tradeables sector, the subsidies being financed by taxation of the mineral sector.

---

15. See Corden (1984).

SECTION III

DEVELOPMENT PROBLEM OF MINERAL ECONOMIES

This section examines some of the broad structural and institutional characteristics of developing countries with an important mineral sector. Mineral economies are popularly perceived as being more favourably circumstanced with regard to initiating development. The existence of an important mineral sector substantially relaxes the fiscal and foreign exchange constraints facing most other developing economies. In most of these countries the Government is the major recipient of mining revenues and hence is in a position to initiate more ambitious development programmes. However, this is not an unmixed blessing as their greater dependence on a single sector for large shares of their fiscal and foreign exchange resources implies that Government revenues are likely to mirror instabilities and fluctuations in the world market for the mineral.

The development policies for mineral economies are broadly similar to those of other developing countries. The major objective being to utilise the mineral revenue for the development and diversification of the economy. However, given the exhaustible nature of the

mineral resource, there is a need to accelerate the pace of development and diversification while the increased revenues from mining are still available.

The Governments in these countries face important decisions regarding the allocation of the increased revenue between current consumption and investment. With regard to investment they have to decide on the appropriate sectoral allocation. Studies have shown that mineral economies have embarked on ambitious industrialisation and development programmes. There was also a considerable increase in expenditure on social services. Many of the countries also had an expanded programme of subsidies and transfers. With regard to investment, most of it was concentrated in the infrastructure and resource sectors.

Thus there was an increase in both current consumption and investment expenditure in these countries. However, despite the higher level of investment in these countries Gelb (1985) finds that the pace of increase in productivity and growth was not as rapid as expected.

So far we have examined the development problems facing mineral economies and the type of policies

followed. We now turn to the structural characteristics of these countries.

The group of mineral economies would essentially be classified as primary export oriented countries. This categorisation also includes countries which are predominantly agricultural exporters. For both groups, this pattern results in a lag in industrialisation compared to other developing economies. However, the mechanisms producing this pattern in mineral economies are somewhat different. The literature surveyed earlier notes that a mineral boom can lead to substantive structural changes in the economy in the long run. Agricultural exporters may also experience large windfall gains due to an increase in world demand. However, these are likely to be relatively shortlived. In the short-run, if the size of windfall gains are substantial, some of these countries may also exihibit short-run contraction of the tradeable sector.[16]

The nature of the mining industry also influences the structural characteristics of these countries. The mining industry is highly capital intensive with

---

16. Edwards (1985) examines the effect of coffee price increase on the Columbian economy in terms of the Dutch Disease in Neary J.P. and Van Wijnbergen, S.(eds). Natural Resources and the Macroeconomy.

limited possibilities for substitution of labour. The complex nature of equipment needed for mineral extraction implies it cannot be produced locally. Thus the production linkages of the mining industry with other sectors in the economy are minimal.

In most developing countries, the investment in the mining sector was made by foreign mining companies. These have continued to dominate the mineral sector in many countries. In other countries this sector has been nationalised. Taxation of the mineral sector is an important source of revenue for the Government. Thus Nankani notes that the fiscal linkage is dominant in mineral economies. Despite, the substantial relaxation of the resources constraints, the economic performance of mineral economies has not been as good as expected.

Mineral economies have been found to be performing worse on average then other developing economies on various economic indices. A study by Nankani (1979) of twenty six mineral economies finds that these countries performed much worse than other developing economies on a variety of economic indices criteria. For example, mineral economies fared much worse on export diversification than non-mineral developing economies despite, this being a major stated objective for them.

The performance of the agricultural sector for the mineral group was much poorer than for other non-mineral developing economies. The deterioration in this sector was also reflected in the higher share of food imports for the mineral group. Nankani also finds some evidence that mineral economies showed greater tendency towards technological dualism and wage dualism.

SECTION IV

This section briefly outlines some of the main issues this study focuses on. The major objective of the study is to examine the influence of the Dutch Disease type forces on long-term structural change in developing economies. The starting point for the analysis is the average pattern of structural change estimated by the Chenery and Syrquin (1975) study. Dutch Disease theory suggests that both in the short and long-run there will be a reallocation of resources away from the tradeables to the non-tradeable sector. The normal process of development requires an increase in the share of industry with per-capita-income, and a decline in the share of primary activities. Thus the manifestation of the Dutch Disease is likely to reinforce the declining tendency for the agricultural

sector, whereas for industry it may work to inhibit or retard the tendency for its share to increase.

The other important issue is the type of broad development policies followed by these countries. At one level we are interested in examining broadly the type of expenditure policies followed. For example, the split between current consumption and investment is important for the future development prospects of these countries. The sectoral allocation of the increased expenditures (i.e whether they impinge more on tradeables versus non-tradeables) is important from the point of view of the Dutch Disease. The sectoral allocation of Government investment is also important. Direct Government investment in industry for example may mitigate some of the contractionary effects of the Dutch Disease. Similarly, the type of foreign trade regime would also have an important influence on resource allocation.

The Structure of the Study

Chapter two focuses on the broad pattern of resource allocation obtained for mineral economies. This is compared with the Chenery-Syrquin pattern to establish differences in the average pattern for mineral economies. Secondly, broad differences in the pattern

for mineral economies due to the operation of group specific factors such as differences in the size of the mineral sector, the effect of scale (population) and the production orientation of the non-mineral economy are also examined.

Chapter three: looks at the basic response of the mineral economies to the increased real income, and their basic development policies are also examined. Deviations of the actual pattern of resource allocation for individual countries from predicted shares obtained from the equation for mineral economies are then analysed in terms of the development policy variables such as the rate of investment, and the foreign trade regime as well as the real exchange rate. The pattern of individual country's structural change, trends in exports and the real exchange rate are also examined to determine the effect of a mineral sector on individual country resource allocation.

Chapter four: gives a summary of main findings and some broad conclusions.

CHAPTER II

THE OVERALL PATTERN OF STRUCTURAL CHANGE FOR MINERAL ECONOMIES

CHAPTER TWO

INTRODUCTION

The main objective of this chapter is to characterize the pattern of structural change for mineral economies. The study is a pooled time series cross-sectional analysis over the period 1964-1985 for a group of 32 mainly mineral economies. The average pattern of structural change estimated by the Chenery-Syrquin (1975) study is used as a benchmark to establish differences in the timing and sequencing of resource allocation processes in mineral economies, from the norm pattern[1]. The primary focus of this study is on changes in the structure of production. The Chenery-Syrquin study is more comprehensive in its coverage of all major aspects of the accumulation and resource allocation processes, whereas the two key sectors of interest here are agriculture and industry, which represent the major components of the, tradeable sector in most countries. The normal pattern of change with growth shows a rise in the share of industry and a decline in the share of primary activities in GDP. However, for mineral economies the pattern of change is

---

1. Chenery, H. B. and Syrquin, H. Patterns of Development 1950-70. Oxford: Oxford University Press, 1975.

affected both by the above tendencies and Dutch Disease type forces due to the existence of an important mineral sector.

The theoretical literature on the Dutch Disease emphasizes the negative effects on profitability and output both in the short and long-run. Thus these countries would be characterized by a reallocation of resources away from tradeable to non-tradeables. The objective of the cross country equations is to establish whether such a reallocation has indeed taken place.

This chapter also examines broad differences in the pattern of change for mineral economies which arise from differences in the size of the mineral sector, production orientation of the non-mineral economy, and population. Segmentation of the sample of countries by any one of these criterion, assumes that the average pattern for mineral economies hides underlying variation in group patterns due to the operation of certain group specific factors.

The rest of this chapter is as followed: Section two gives a brief summary of the main theoretical and empirical findings of the Chenery-Syrquin (1975) study. Section three outlines some possible hypotheses on the

pattern of structural change in mineral economies. Section four gives the econometric procedure and sample composition. Section five presents the main findings regarding the pattern of structural change for mineral economies. Section six looks at broad differences in the pattern arising from the operation of group factors.

SECTION TWO

Structural Change in Developing Economies

The rise in the share of industrial output and the decline in the share of primary output in GDP with rising per-capita-income are among the best documented features of the process of development. Kuznets (1966), identified the shift of resources from agriculture to industry as being a basic feature of development process for the currently developed economies[2]. The Chenery and Syrquin (1975) study extended the scope of the research to cover the post -war development pattern for lower-income developing economies. They also developed a methodology for comparing the sources of industrialisation in different countries. Subsequent

---

2. Kuznets, S. (1966). Modern Economic Growth. New Haven, Conn. : Yale University Press.

work by Chenery (1979), Chenery, Syrquin, Robinson (1985) extended and refined the scope of cross-country analysis[3]. The basic result of an increase in the share of industry and decline in share of primary activities was found to be a valid feature of development for the group of developing economies.

The observed uniformities in the process of structural change suggest the dominance of universal factors in influencing resource allocation processes in countries.Chenery and Syrquin identify the following universal factors:

(1) Similar changes in demand with income ----this is basically the tendency for the share of food consumption to decline with rise in income. Thus rising income level are associated in all countries with a shift away in demand from food and primary products to manufactured products.

(2) The accumulation of both physical capital and skilled labour relative to population leads to a change

---

3. Chenery, H.B. (1979), Structural change and Development Policy. (New York: Oxford University Press.)

   Chenery, H.B. Robinson, S. and Syrquin, H., (1985). Industrialisation and Growth: A Comparative Study. (Oxford : Oxford University Press).

in factor proportions and comparative advantage towards manufactures.

(3) Similarities in opportunities for international trade and international capital movements.

Differences in individual country patterns are attributed to arise from differences in initial conditions, variations in natural resources, size of the country, and the development strategy adopted. The Chenery and Syrquin study estimates the average pattern of structural change. To obtain a clearer understanding of the processes underlying structural change, the sample was segmented according to various criteria.

The size of the population was taken as an indicator of market size. Countries were classified into two groups: large countries with populations greater than 15 million; and small countries with populations less than 15 million. Separate patterns were estimated for these groups. Broadly large countries canbe expected to industrialize earlier in response to the larger domestic market. The structure of production in these countries would tend to be more balanced and less specialized as trade is relatively unimportant for these countries.

The group of small countries was further divided into small primary (SP) and small industrial oriented (SI) groups on the basis of the trade orientation index.[4] Countries with rich natural resources have tended to specialize in primary exports. The SP group was able to maintain a primary bias till fairly high levels of income. Industrialisation in the SP countries was seen to lag behind the average pattern. The SI group had a relatively small natural resource base, and were therefore forced to develop industrial exports at fairly low income levels. Most countries in this group were also characterised by abnormally high inflows of external capital in the early stages. The availability of external capital replaced primary exports as a source of foreign exchange, and enabled the SI group to continue growing while developing the capability to export manufactures. Industrialisation in this group of countries was considerably higher than for the SP

---

4. The Trade Orientation index compares actual trade bias to the one predicted by the cross country from cross-country regressions. Trade bias was defined as TB = (Ep-Em)/ E and Trade orientation index as TO= TB-$\hat{TB}$ where Ep, Em and E stand for primary, manufactured, and total exports. For purposes of analysis countries where classified as primary oriented (high values of TO) and industrial oriented (significantly negative values of TO).

group, and structurally these countries were close to the large group.

The above pattern of change canbe considerably modified by the type of development strategies followed. The most important difference in policies being on the trade side. The principal distinction was between outward looking regimes which do not penalise exports and inward oriented policies which actively favour import substitute industries. The outward oriented strategy is characterised by a relatively higher share of exports to GDP compared to predicted shares. The inward oriented strategy is characterized by low and declining shares of exports, and a continued primary bias in exports as the trade regime makes development of manufactured exportables unprofitable[5].

So far this section has briefly outlined some of the main factors which influence long-run structural change in developing countries. Clearly, apart from the universal factors, the type of development strategy followed, the natural resource endowments and to some

---

5. See for example Balassa, B (1980) The Process of Industrial Development and Alternative Development Strategies. World Bank Staff Working Paper No.438. 1980.

extent the size of the economy have an important bearing on long-run structural change.

SECTION III

The main purpose of this chapter is to characterise the development pattern of mineral economies. There are two main aspects to this: firstly,broad differences in the pattern of change for mineral economies from the Chenery and Syrquin norm; secondly, differences in the pattern due to differences in resource endowments and development policies.

This was done as follows:

(1) Comparision of the patterns of structural change for mineral economies with the Chenery and Syrquin norm patterns particularly for the two main tradeables, agriculture and industry.

(2) Broad differences in the pattern of change for mineral economies arising from differences in the size of the mineral sector in GDP, the production orientation of the non-mining economy, and the effect of scale. Seperate equations were estimated for the sub-groups and these patterns were compared with the average pattern for mineral economies.

Factors Affecting Structural Change in Mineral Economies

The earlier section had outlined some of the main results of the Chenery and Syrquin (1975) study on structural change. This section examines factors which are likely to affect resource allocation in mineral economies.

The Dutch Disease literature emphasizes the macro-economic effects of a mineral sector. The short run adjustment to a boom requires a real appreciation, which affects profitability in the tradeables sector adversely and therefore causes a movement of resources out of this sector in the short-run to non-tradeables. The longer-run adjustment, is also likely to result in reallocation of resources (both labour and capital) from tradeables to non-tradeables. The models predict that the real exchange rate is likely to remain appreciated as long as the spending effect is dominant.

Thus in most developing countries, the Dutch Disease would be reflected in a more rapid decline in the share of agriculture in GDP. With regard to industry, the effects are less clear cut. The normal pattern of transition requires an increase in the share of industry, but the operation of the Dutch Disease is

likely to inhibit its development, particularly that of the manufactured exportable sector.

The Chenery and Syrquin study defines industry to include both manufacturing and construction. The manufacturing sector canbe considered a tradeable whereas construction is a non-tradeable in most countries, and hence is likely to be a net beneficiary from the spending effect of a boom. Disaggregation of industry is likely to give a clearer picture of the forces at work.

Almost all developing economies have pursued policies of import substitution in highly sheltered domestic market. This strategy effectively makes import competing industries non-tradeable and again it is possible that this sector actually benefits from the spending effect of the boom. The effect of such a strategy on manufactured exports is likely to be even more adverse.

Segmentation of the Sample :

To obtain a clearer understanding of the various influences on resource allocation , the study also looks at broad differences in patterns arising from the

operations of group specific factors. Given the limitations of the sample size, it was only feasible to classify countries according to one feature at a time. Cross-classification of the sample by two or three criteria as done in the Chenery-Syrquin study would have led to too small sample sizes.

The estimation of the average pattern of change, assumes that all the factors influencing structural change apply with equal force throughout the transitions. This is not necessarily the case for example, with regard to the size of the mineral sector. For countries with smaller mining sectors, this sector may have a positive effect on industrialisation by relaxing fiscal and foreign exchange constraints which otherwise constrain industrial development. On the other hand for countries with larger mineral sectors the negative effects of the Dutch Disease may dominate. Similarly the effects of scale leading to differences in the pattern of structural change due to the market size effect on industrialisation have been well established by the Chenery and Syrquin study. The intuitive rationale underlying the proposed segmentations, is presented below.

The Share of Mining Sector :

The share of mining sector is likely to be an important indicator of the strength of the Dutch Disease forces. Theory suggests that the larger the share of mining in GDP, the greater is likely to be the step-up in GDP attributable to this sector and hence the spending effect. The resulting real appreciation arising from excess demand pressures is likely to be correspondingly more severe, though as noted earlier, the reallocation of resources from tradeables to non-tradeables would moderate the extent of the appreciation in the long-run. Countries with smaller mineral sectors, may face a real appreciation for some time only whilst the necessary structural changes to the boom are being made, and the magnitude of the real appreciation is also likely to be less severe. Therefore, for these countries we would expect the negative effects of a boom to be smaller particularly in the longer-run.

The sample was divided into two groups :

a) Countries with small mining sector where the average share of the mineral sector during the period 1970-81 was less than 15% of GDP. (These countries were termed the V1 group)

b) Countries with large mining sectors, where the average share of the mineral sector during the period 1970-81 was greater than 15% (These countries were termed the V2 group).

Index of Production Orientation :

The sample countries were also analysed according to the production structure of the non-mineral economy. Inclusion of the mineral sector would naturally make all the sample economies primary oriented. However, we were interested in determining an index which would provide certain broad indications of differences in Governments development strategy.

The Production index was defined as deviations of actual shares of agricultures and industry from predicted shares from the equation for mineral economies.

$$PO = (V_A - V_I) - (\hat{V}_A - \hat{V}_I) = P - \hat{P}$$

where V_A and V_I are the actual shares of agriculture and industry, and, $\hat{V}_A$, and $\hat{V}_I$, the predicted shares. Positive values of the index indicate a bias towards agriculture compared to the norm for mineral economies. Similarly negative values showed a bias in favour of industry compared to the predicted shares for the mineral economies. Greater than norm industrial

sectors can be attributed to the possibly greater stress on industrialisation and import substitution by these countries. The effect of such policies would be to alleviate some of the negative effects of the Dutch Disease on industry. However the negative impact of import substitution policies on the agricultural sector and exports are well known.

Effect of Scale :

The final classification aims to take some account of the effects of scale or market size on the pattern of structural change for these economies. However, most of the sample countries had populations less than 15 million and would therefore be defined as small countries by the Chenery - Syrquin criterion. Therefore, it was not possible to use this cut-off. Even within the category of small countries, there were countries with very small population e.g. Guyana, Congo, Liberia, Libya etc., Others had populations of a more moderate size. The sample was segmented into small economies with population less than 8 million in 1974-75 and medium sized economies with population greater than 8 millions.

Small countries are likely to be very open, with trade accounting for a high share of GDP (about 20%-30% of GDP on average). The small size of these countries as well as their dependence on mineral exports, make this group particularly vulnerable to the negative effects of the Dutch Disease. For very small economies, substantial industrialisation is only feasible with export led growth. More medium sized economies have some scope in developing domestic industry to serve the domestic market.

SECTION IV

Econometric Method and Data

The study is a cross - sectional analysis of 32 developing countries. Most of the countries in the sample have some amount of mining activities, although the contributions of the mining sector in GDP varies in importance. At one extreme we have the major oil exporters (Saudi Arabia, Libya, Iran etc.) with very high shares of mining in GDP. At the other extreme there are a few economies (Ivory Coast, Greece, Kenya, and Panama) with very small mining sectors and were primarily agricultural commodity exporters. Table 1 gives the list of the countries with the share of mining in GDP and population. Unlike the Chenery and

Syrquin study the sample also contains countries with population less than one million.

The regression equations estimated were of the Chenery-Syrquin type.

Table I

The Mineral Economies : Shares of Mining in GDP and Population.

Country	Share of Mining in GDP 1974 in %	Population in 1974 in millions
Algeria	33.8	16.3
Bolivia	23.1	5.5
Chile	11.96	10.03
Congo	13.7	1.3
Ivory Coast	0.27	6.5
Ecuador	17.6	6.83
Gabon	50.12	0.99
Greece	1.24	8.96
Guyana	12.04	0.769
Indonesia	20.6	133.06
Iran	47.02	32.5
Iraq	60.12	10.77
Jamaica	9.12	2.0
Jordan	4.4	2.618
Kenya	0.3	12.9
Liberia	31.35	1.5
Libya	61.94	2.3
Madagascar	3.2	7.5
Malaysia	9.01	11.6
Mauritania	25.2	1.4
Morocco	12.82	16.9
Nigeria	35.9	65.4
Panama	0.2	1.6
Peru	5.9	14.8
Saudi Arabia	79.03	6.9
Sierra Leone	16.53	3.0
Trinidad & Tobago	33.2	1.07
Tunisia	11.6	5.46
Venezuela	32.8	11.63
Zaire	11.02	24.2
Zambia	32.61	4.88
Zimbabwe	7.3	6.08

The equation estimated was :

$$X_i = a + b_1 \log Y + b_2 (\log Y)^2 + c_1 \log N + c_2 (\log N)^2 + d F$$

Where

Xi = share of sector in GDP

Y = Per Capita GDP in 1964 US dollars.

N = Population in millions

F = net resouce inflow (Imports minus exports of goods and nonfactor services) to GDP

The analysis was also conducted using the share of the mining sector in GDP as an additional explanatory variable in the basic equation. The rationale for its inclusion was to take into account it's hypothesized effect on the share of tradeables. The equation 1.2 was of the form :

$$X_i = a + b_1 \log Y + b_2 (\log Y)^2 + c_1 \log N + c_2 2 (\log N)^2 + dF + eVm$$

Where VM is the share of mining in GDP.

The sample contries were also classified into sub-samples on the basis of the following criterion :

(1) Share of mining sector :

VI : Countries with mining sector acounting for less than 15% of GDP

V2 : Countries with mining sector accounting for more than 15% of GDP

2. Production orientation :

P group : Countries with positive values of this index on average.

I group : Countries with negative values for this index on average

3. Scale :

S group : Countries with population lessthan 8 million in 1974-75.

M group : Countries with population greater than 8 million in 1974-75.

Presentation of the Results :

The Predicted shares for the sectors were obtained. The variation in the predicted shares with Per-capita - Income obtained for a country of medium size N = 10 (for comparability with the Chenery - Syrquin Study), for the income range between $100 - $1000. Average values of F were used.

The resulting pattern was then compared with the average pattern of change given by the Chenery - Syrquin study. This comparison gives an idea of the

differences in timing of structural change for mineral economies as compared to the Chenery - Syrquin norm pattern.

Variations of predicted shares with income were also obtained for the sub-samples. These were compared with the average pattern for mineral economies to determine variations in the process of structural change arising from the operation of group factors.

SECTION IV

The Overall Pattern of Structural Change :

The results of the estimated equations for mineral economies are presented here. For each sector two versions of the equation were estimated ; one of the basic Chenery - Syrquin form (equation 1.1), the second version included the effect of the share of the mining sector (equation 1.2). The results of both are presented in Table 2 .

The estimated equations of (1.1) form for industry and agricuture are first compared to the Chenery-Syrquin equations for these sectors. The results were broadly similar to the Chenery - Syrquin equations, though there were some interesting differences.

The coefficients for the income and population terms had the expected signs. The characteristic rapid rise in the share of industry at lower income levels and subsequent tapering off in the rate of increase was also shown by the mineral economy equation by large positive coefficients for the log Y term and negative coefficients for the $(\log Y)^2$ term. This was in keeping with the expected pattern of an early acceleration in the share of industry at lower income levels. Disaggregation of industry into its two component manufacturing and construction showed somewhat differing responses to income. Surprisingly, the pattern of early acceleration with income was more clearly shown by the construction sector whereas for the manufacturing sector the negative effect of the squared income term was not very significant.

The effect of market size was somewhat different from the Chenery-Syrquin pattern. For both industry and its component manufacturing, the direct effect of population was significant and positive. However, unlike the Chenery-Syrquin equation the negative effect of the squared term was not significant. This may be due to the sample containing more countries with small populations, and hence though the direct effect of scale was important for industrial development, its

Table 2

Basic Regressious of Share

Dependent Variable	C	Log Y	$(\text{Log Y})^2$	Log N	$(\text{Log N})^2$	F	VM	R^2	SEF	Sample Size
Share of Industry Mineral Economies)										
1) Eq.1.1	0.4678 (-4.6)	.1718 (5.0)	-.0128 (-3.83)	.0286 (5.67)	-.0025 (-1.9)	.1816 (8.79)		.34475	.0493	581
2) Eq.1.2	-.501 (-5.57)	.18875 (6.13)	-.012 (-4.57)	.0128 (2.76)	.0012 (1.01)	.055 (2.61)	-.1814 (-12.47)	.487	.0438	581
Share of Industry Chenery-Syrquin	-.547 (9.8)	.158 (8.3)	-.006 (3.8)	.06 (13.9)	-.008 (9.4)	.213 (10.2)		.714	.057	1325
Share of Agriculture										
1) Eq. 1.1	1.4385 (11.5)	-.339 (-7.9)	.0201 (5.53)	.0231 (3.7)	-.0067 (-4.16)	.0844 (3.29)		.648	.0612	585
2) Eq. 1.2	1.403 (12.08)	-.321 (-8.05)	.0194 (5.8)	.00711 (1.18)	-.00291 (-1.89)	-.0437 (-1.6)	-.18321 (-9.7)	.697	.0568	585
Share of Agriculture Chenery & Syrquin	2.025 (26.1)	-.466 (17.23)	.028 (5.03)	-.03 (3.1)	.004 (20.1)	-.588		.754	.079	1325

t ratio's in parentheses

Dependent Variable	C	Log Y	$(LogY)^2$	Log N	$(LogN)^2$	F	VM	R^2	SEE	Sample Size
Manufacturing										
1) Eq. 1.1	-.21462	.0795	-.005	.0342	-.005	.1495		.2216	.048	557
	(-2.13)	(2.3)	(-1.72)	(6.77)	(-3.83)	(7.0073)				
2) Eq. 1.2	-.256	.09901	-.0057	.01684	-.00074	-.0115	-.211	.4485	.0404	557
	(-3.0)	(3.4)	(-2.3)	(3.83)	(-.65)	(-.56)	(-15.04)			
Construction										
1) Eq. 1.1	-.2324	.087	-.0058	-.0083	.0028	.0522		.226	.0263	553
	(-4.2)	(4.586)	(-3.62)	(-3.0)	(3.9)	(4.51)				
2) Eq. 1.2	-.227	.084	-.0057	-.0058	.00216	.0755	.03043	.2414	.02603	553
	(-4.14)	(4.8)	(-3.59)	(-2.042)	(2.96)	(5.64)	(3.4)			
Manufactured Exports										
1) Eq. 1.1	.1014	-.0186	.0014	-.0035	-.00145	.0758		.1258	.0367	517
	(1.16)	(-.63)	(.57)	(-.897)	(-1.4)	(4.56)				
2) Eq. 1.2	.1054	-.0184	.0016	-.0081	-.0004	-.0401	-.0501	.1514	.0361	517
	(1.23)	(-.63)	(.66)	-(2.00)	(-.414)	(2.19)	(-3.92)			

Note : Equation for manufactured exports for the period 1966-1985 and also without Iran and Iraq. t ratio's in parentheses.

potential had not been exhausted. Net capital inflows were more important for industrial activities than agriculture.

The inclusion of the share of mining as an independent variable was highly signficant for all activities, and led to fairly large improvements in goodness of fit particulrly for the manufacturing equation, (Ref. Table 2). The coefficient of VM had a clearly negative effect on the manufacturing sector whereas it had a mildly positive coefficient for the construction sector. Its effect on the agricultural equation was also strongly negative. The results therefore appear to support the postulated negative effects of the mining sector on both tradeables sector. On the other hand, the significant and mildly positive effect on construction activities, is again in keeping with the positive effect of the mineral sector on non-tradeables.

The construction sector is only a part of the non-tradeable sector. In most developing economies the composition of the non-tradeables sector is fairly heterogeneous comprising services, public utilities, construction, and Government administration. The share of non-tradeables as a whole is therefore highly

influenced by Government policies, and it becomes difficult to disentangle the effects of the spending effect on this sector as a whole.

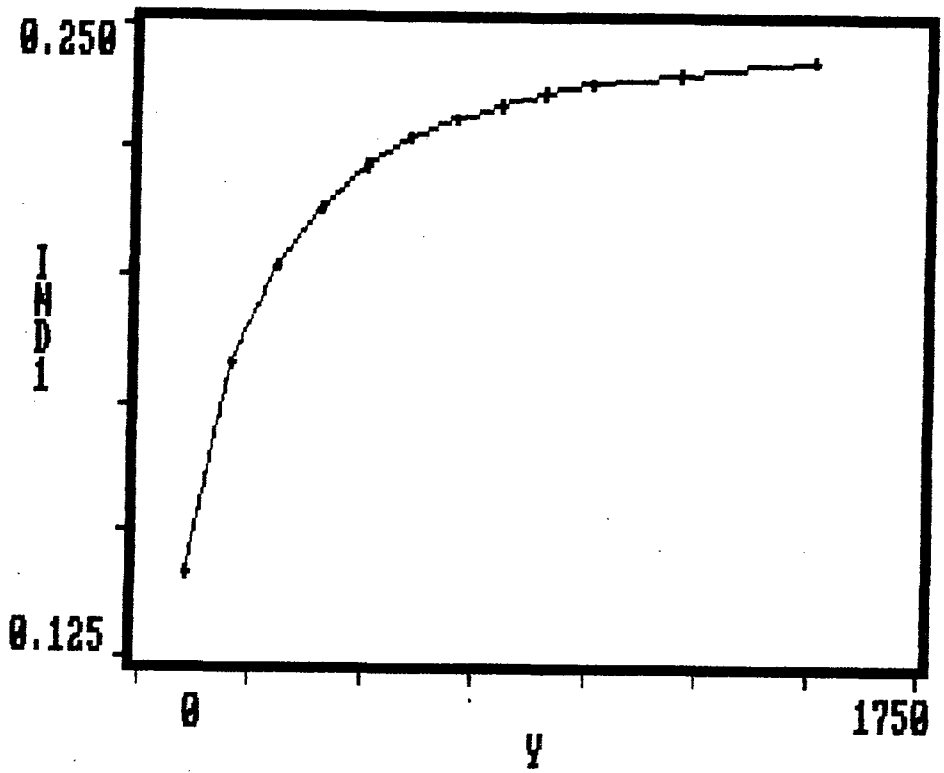
Variation of Shares with Income :

Predicted values for the share of the sectors with income are presented in Table 3 along with predicted shares for agriculture and industry from the Chenery - Syrquin study to aid comparison. (Graphs of the variation of shares with income are also presented).

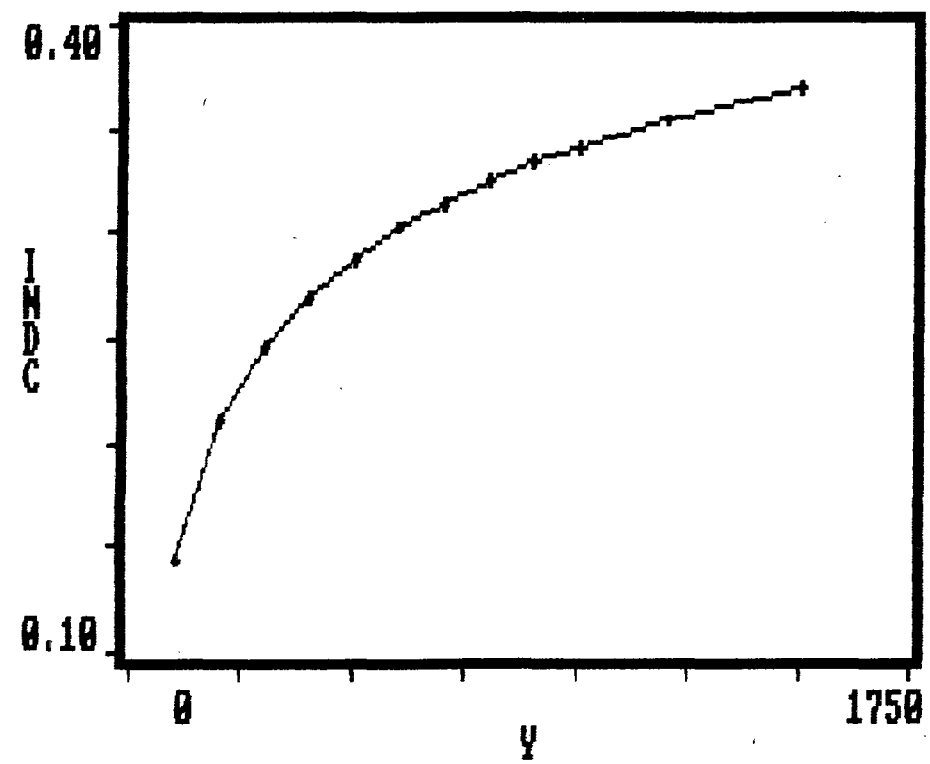
Not surprisingly, the share of industry lagged considerably behind the Chenery-Syrquin shares at each income level, with the extent of the gap increasing at higher income levels. Nevertheless, the increase in the share of the industry for mineral economies was relatively faster at lower income levels (an increase of 6% between $100-$3000) see fig. 1. However, the rate of increase slowed down considerably over subsequent levels. The share for mineral economies at $1000 was 23% compared to 35% for the norm pattern.

The pattern for manufacturing was similar, with a fairly rapid increase in share at low income levels (the share increased from 12.4% to 15.5% over $100 to

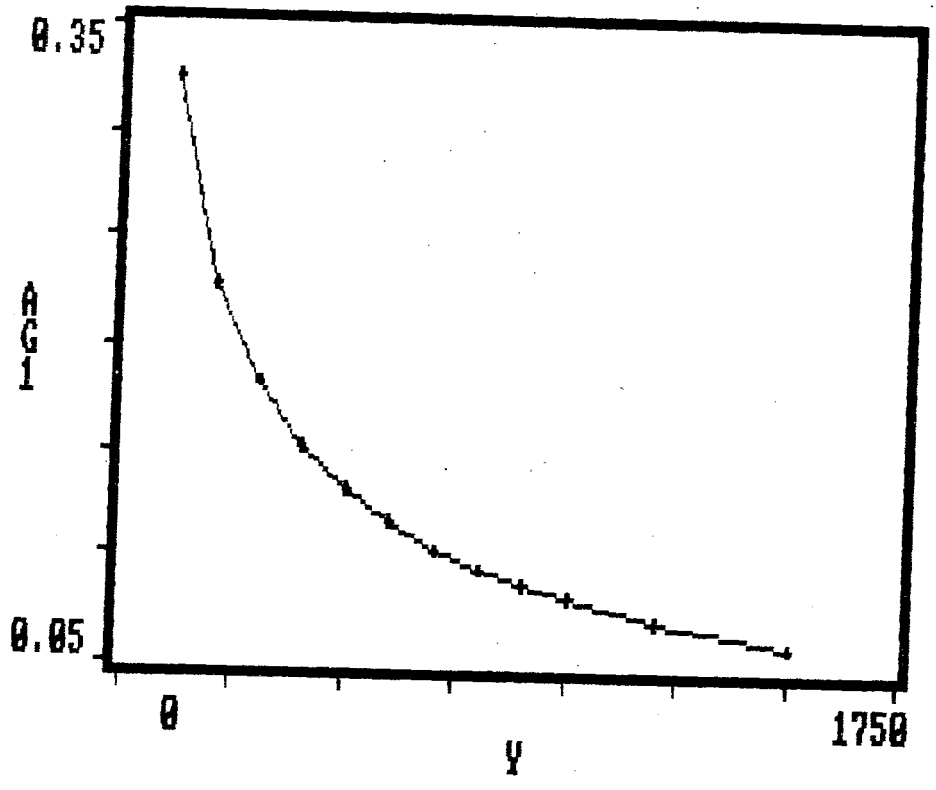
Variation of Industry With Income -- Mineral Economies



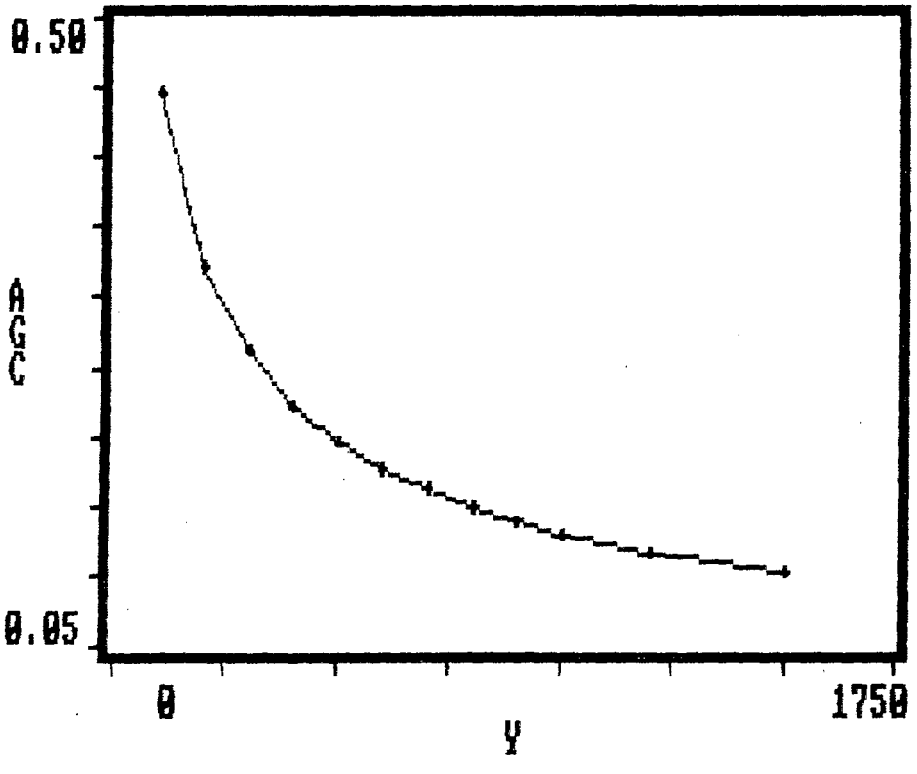
Variation of Industry With Income -- Chenery & Syrquin



Variation of Agriculture With Income -- Mineral Economies



Variation of Agriculture With Income -- Chenery & Syrquin



$300) and a slow down in the rate of increase at middle to higher income levels. The share ultimately stagnated at 17.4% of GDP $1000, the share of construction also followed this pattern, and its share stagnated at 8% at higher income levels.

The stagnation in industry at higher income levels results from the stagnation in the shares of both manufacturing and construction. The stabilisation in the share of construction after a certain level is an expected phenomenon for most countries given the nature of construction activities. Thus it is the stagnation in the share of manufacturing activity in GdP which is likely to be responsible for the lag in industrialization. Given that this sector is a tradeable, it is likely that the Dutch Disease is responsible for its stagnation. The pattern of variation of industry was also compared with the pattern for small - primary Oriented countries. This group includes both agricultral exporters and mineral exporters. The share of industry for mineral economies was found to be consistently below the pattern than for this group also.

The share of manufactured exports for mineral economies was found to be stagnant at very low levels

(between 2-3% of GDP) throughout the transition, where the norm pattern showed a steady rise in manufactured exports with income levels to 10% at $1000.

With regard to the agricultural sector, comparisons with the Chenery - Syrquin norm can only be indicative of the basic trend as they consider the share of the primary sector as a whole. However, the decline in the share of agriculture for mineral economies appeared to be much sharper than the norm (a decline from 32.6% to 8% for mineral economies versus 45.2% to 13.8% for the norm). In both patterns the rate of decline is particularly steep at lower income levels. However, whereas the decline in the norm pattern tapers off after income levels above $500, the share for mineral economies continues to decline although at a slower rate. See Fig

The following are the main findings emerging from this section :

(1) Both groups of tradeables showed shares which were well below that predicted by the norm pattern for the same income level. This along with the significantly negative effect of the Vm coefficient on both tradeables suggests that the Dutch Disease mechanism

Table - 3

The Normal Variation in the Structure with Income(%)

Process	Predicted Values at Different Income Levels $100	$200	$300	$400	$500	$800	$1000	Total Change
Industry :								
1. Mineral Economy	.142	.183	.2022	.214	.2213	.234	.238	.096
2. Chenery** Syrquin Overall	.149	.215	.251	.276	.294	.331	.347	.254
3. Chenery*** Syrquin small Primary Countires	.139	.188	.217		.254	.288	.304	.165
Agricuture								
1. Mineral Economies	.326	.2293	.1818	.1521	.131	.0943	.0799	-.2461
2. Chenery** Syrquin Overall	.452	.327	.266	.228	.202	.156	.138	-.395
3. Chenery*** Syrquin (Small Primary)	.457	.334	.277		.222	.186	.175	-.282
Manufacturing	.124	.145	.155	.1605	.165	.1716	.1742	.0502
Construction	.0408	.061	.0704	.0759	.0794	.0851	.0868	.046
Manufactures Exports : Mineral Economies	.0267	.025	.0246	.0248	.0251	.0262	.0269	.0002
Chenery** Syrquin Overall	.019	.034	.046	.056	.065	.086	.97	.12

* Predicted Values for Mineral Economies use equation 1.1 PCGDP in US$ 1964, N=10, F=.0248 (average)

** Ref Table 3, Chenery and Syrquin (1975)

*** Ref Table 511, Chenery and Syrquin (1975)

was important in influencing resource allocation in these countries.

(2) At lower income levels, the mineral economies also tended to show a relatively normal pattern. The tendency to stagnate for manufacturing only occurred at higher income levels.

Table 4

Classification of Countries by size of Mineral Sector

Mineral Sector less than 15% of GDP for 1970-81	Mineral Sector Greater than 15% of GDP for 1970-81
Bolivia	Algeria
Chile	Congo
Ivory Coast	Ecuador
Greece	Gabon
Jamaica	Guyana
Jordan	Indonesia
Kenya	Iran
Madagascar	Iraq
Malaysia	Liberia
Morocco	Libya
Panama	Mauritania
Peru	Nigeria
Sierra Leone	Trinidad & Tobago
Tunisia	Venezuela
Zimbabwe	Zaire
	Zambia
	Saudi Arabia.

SECTION V

So far this chapter has broadly characterised the overall pattern of structural change for mineral economies. In this section, the sample is segmented

according to various criteria, to examine difference in the pattern of change arising from the operation of group specific factors. Subdivision of the sample can also reveal more accurately difference in timing and sequencing of processes concealed in the averages for all countries, and therefore results in more accurate estimates of the effects of other variables.

Variations in the size of the mineral sector :

This segmentation aimed to capture the differences in the resource allocation pattern arising from differences in the relative importance of the mineral sector in GDP. Essentially theory suggests that both the short and long run effects of a larger mineral sector on resource allocation are likely to lead to a more acute manifestation of the Dutch Disease

The sub-division of the sample was found to be significant for all the sector considered (The F tests significance at the 95% are given in Table 5). The equation for the complete sample is taken to be represent the average pattern for mineral economies. The equation used was of the (1.2) form and included the Vm term as the overall fit of these equations was superior.

The Results :

The results showed come interesting differences in the equations for the two sub-groups particularly for industry and its component manufacturing. For the small mineral group (V1), the coefficient of Vm was significant and exerted a strongly positive effect on both the share of industry and its component manufacturing. This is unexpected as it suggests that in countries with smaller mineral sectors, industrialisation, and particularly the manufacturing sector appears to have benefitted from a mineral boom. On the other hand, in the large mineral sector group (V2) equation, the Vm coefficient was strongly significant and had the expected negative sign.

There also appeared to be some differences in the operation of the income effect for the two groups. The income term were highly significant and had the expected sign for the V1 group. For the V2 group however, both income coefficients were insignificant, with low values. Thus for the V1 group the operation of the univeral factors i.e. income and population had an important effect on structural change, whereas for the V2 group it appears that the resource allocation

Table - 5

Segmentation by Size of Mineral Sector

Share	Sample size	C	Log y	$(\text{Log Y})^2$	Log N	$(\text{Log N})^2$	F	VM	R^2	SEF	F ratio
Share of Industries											
1) Overall	581	-.5007	.189	-.01194	.0128	.00121	.0548	-.1814	.487	.0438	
2) VI-(15%)	264	-1.33 (-6.4)	.449 (6.933)	-.0328 (-5.65)	-.0296 (-1.9)*	.0161 (3.53)	.06782 (1.76)*	.1472 (2.93)	.609	.0386	15.5
3) V2-(15%)	317	-.145 (-1.5)	.08005 (2.4)	-.0038 (-1.34)*	.0185 (3.54)	-.0021 (-1.5)*	.0237 (1.43)*	.0201 (-8.8)	.366	.0417	
Share of Manufacturing											
1) Overall	557	-.256	.099	-.0057	.01684	-.00074	-.0117	-.211	.4485	.0405	
2) VI-(15%)	264	-.784 (-4.16)	.249 (3.9)	-.0169 (-3.15)	.00562 (.398)*	.0074 (1.81)*	.0251 (-.717)*	.2299 (5.042)	.558	.0351	26.01
3) V2-(15%)	293	.0614 (.70)*	.0102 (.35)	.0008 (.314)*	.0167 (3.7)	-.0032 (-2.7)	-.053 (-2.4)	-.246 (3.331)	.446	.0354	
Construction											
1) Overall	553	.-227	.084	-.00570	-.00580	.00216	.0755	.0304	.241	.026	
2) VI-(15%)	261	-.593 (-5.8)	.2257 (6.57)	-.0179 (-6.19)	-.042 (-5.5)	.0164 (4.78)	.094 (5.0)	-.079 (-3.21)	.447	.019	8.606
3) V2-(15%)	292	-.147 (-2.06)*	.053 (2.19)	-.0032 (-1.56)*	.0013 (.34)*	.0007 (.714)*	.098 (5.34)	.0603 (4.0)	.253	.0292	

Share	Sample size	C	Log Y	$(\text{LogY})^2$	Log N	$(\text{LogN})^2$	F	VM	R^2	SEF	F_{ratio}
Manufacturing Exports											
1) Overall	517	.1054	-.0184	.00161	-.0082	-.0044	.041	-.0501	.151	.0362	
2) VI-(755%)	249	.315 (1.43)*	-.087 (1.17)*	.0072 (1.143)*	-.0251 (-1.43)*	.002	.1518 (.4)*	.351 (3.65)	.2796 (6.4)	.041	
3) V2-(15%)	268	-.0732 (-1.79)*	.0315 (2.3)	-.0021 (-1.8)*	-.023 (12.1)	.0044 (8.62)	.0153 (1.73)*	-.024 (3.3)	.51	.0142	
Agriculture											
1) Overall	585	1.403	-.321	.0194	.0071	-.0029	-.044	-.183	.697	.057	
2) VI-(755%)	267	2.27 (7.61)	-.64 (-6.32)	.0465 (5.5)	.0384 (1.66)*	-.005 (-.75)*	-.0023 (-.04)*	-.2062 (2.8)	.561	.0574	8.15
3) V2-(15%)	318	1.3142 (10.7)	-.277 (-6.6)	.015 (4.24)	-.0092 (-1.41)*	-.0005 (-.285)*	-.083 (7.083)	-.178	.798	.052	

(t ratio's in parentheses)

V1 - Share of Mining Less than 15% of GDP
V2 - Share of Mining Greater than 15% of ODP
* - Not significant at 95% level
Note : Equation for manufactured exports extimated for the period 1966-85 and exclude Iran Iraq.

process were dominated by the negative effect of the mineral sector.

Variation in the Pattern with Income :

In keeping with expectations, the share of industry for the V2 group lagged well behind that of the V1 group. The share of industry increased substantially for both groups in the early income ranges, However, beyond per-capita income of $400, the share of the V2 group was virtually stagnant whereas for the V1 group the share increased a little faster to reach 26.5% at $1000 versus 21.5% for the V1 group. This was still considerably below Chenery-Syrquin norm patterns, allthough it was somewhat closer to the norm for the small primary oriented countries.

The difference between the two patterns was even sharper for manufacturing, with the share for the V2 group lagging by more than 6% throughout the transition. The behaviour of the construction sector was also in keeping with the Dutch Disease, as in this case the share of the V2 group was consistently higher see fig. With regard to manufactured exports, both groups showed low and stagnating shares of manufactured exports throughout the transition.

Table - 6

Variation in Share with Income

Share	$100	$200	$300	$400	$500	$800	$1000	Total Change
Share of Ind.								
1. Overall	14.1	18.3	20.2	21.4	22.1	23.4	23.8	9.7
2. V1	10.1	18.7	22.3	24.1	25.2	26.4	26.5	16.4
3. V2	13.2	16.1	17.6	18.7	19.4	20.9	21.5	8.3
Share of Manufacture								
1. Overall	12.4	14.5	15.5	16.1	16.5	17.16	17.42	5.02
2. V1	6.9	12.5	15.1	16.5	17.5	18.9	19.2	12.42
3. V2	8.5	9.7	10.5	11.02	11.5	12.41	12.87	4.37
Share of Construction								
1. Overall	4.1	6.1	7.04	7.59	7.94	8.51	8.7	4.6
2. V1	2.6	5.9	7.03	7.0	7.64	7.38	7.10	4.4
3. V2	5.2	6.7	7.4	7.83	8.14	8.7	8.9	3.7
Manufactured Export								
1. Overall	2.7	2.5	2.5	2.5	2.5	2.62	2.7	0
2. V1	4.9	3.79	3.48	3.4	3.42	3.7	3.94	-.94
3. V2	-	-	.3	.5	.67	.86	.95	-
Agriculture								
1. Overall	32.57	22.93	18.18	15.2	13.14	9.4	7.99	-24.58
2. V1	36.75	24.5	19.4	16.7	15.1	13.34	13.21	-23.54
3. V2	29.02	20.2	15.6	12.73	10.64	6.74	5.12	-23.9

Predicted Values use equation 1.2 PGDP in US $ 1964, N=10, F = Average for the group Vm = Average for the group.

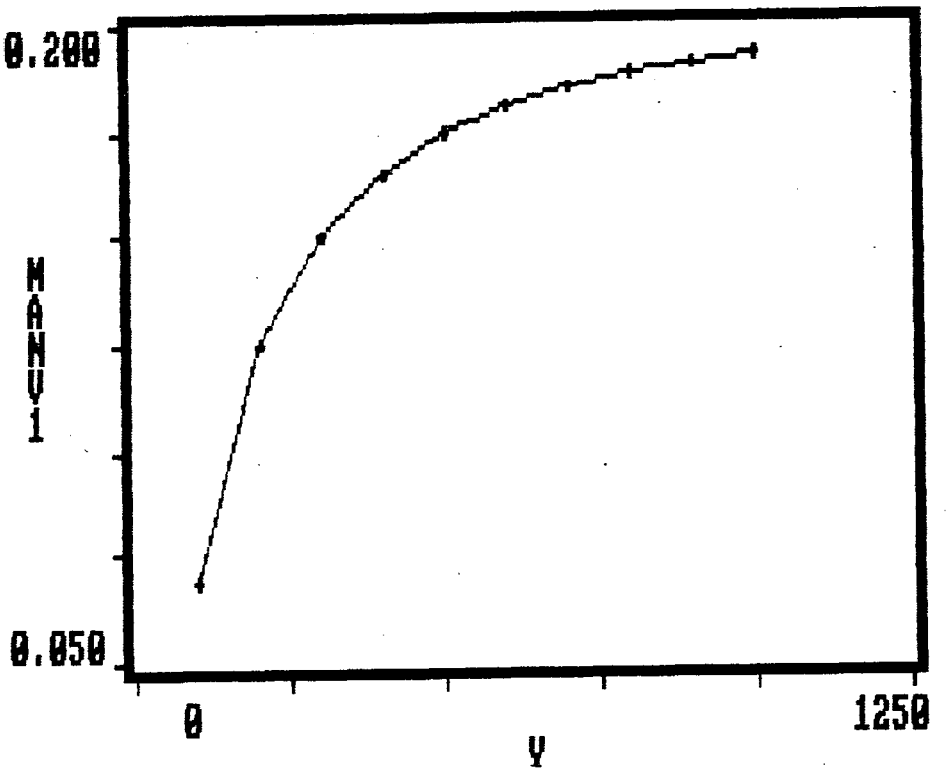
The Agricultural sector appeared to be more severely affected for the V2 group with the share declining from 29% to 5% over the transition. This sector performed better for the V1 group, with the decline at higher income levels showing a tendency to be more moderate, the share at $1000 was 13% for this group.

Thus segmentation of the sample by size of mineral sector gives the following main findings :

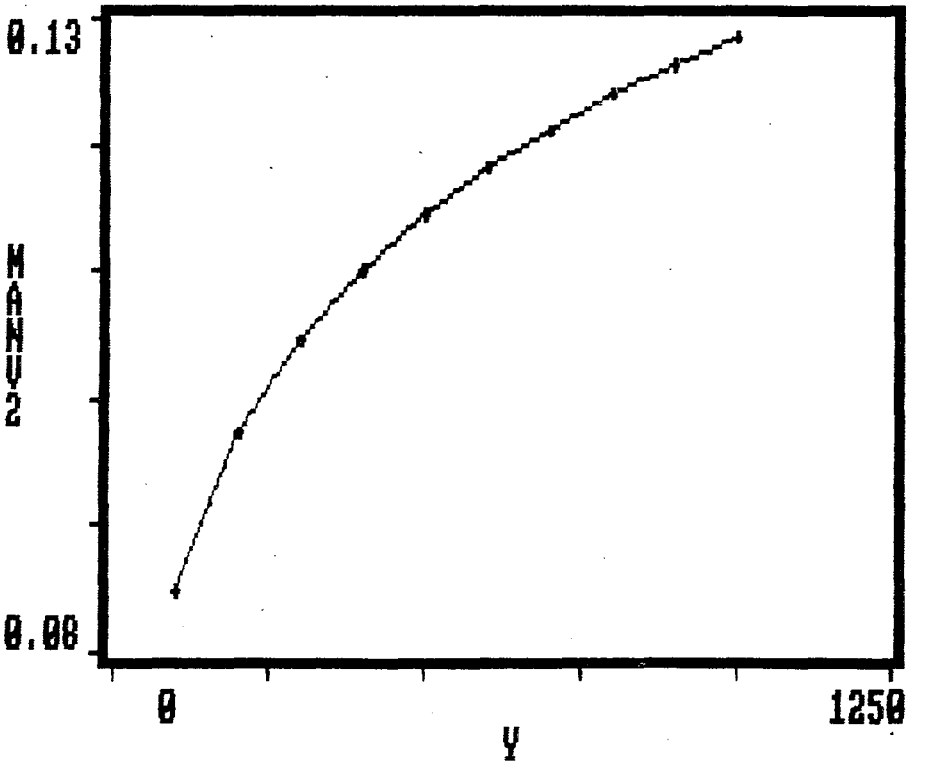
1. The negative effects of the mineral sector on manufacturing was much less for the V1 group, and infact the equation suggests that it exerted a positive influence on manufacturing. Nevertheless, both manufacturing and industry for this group were still considerably below the Chenery - Syrquin norms. The effect of the mineral sector in these countries still resulted in a lag in industrialisation.

2. The V2 group of countries showed more clearly the influences of the Dutch Disease on resource allocation. The performance of both manufacturing and agriculture was much worse for this group than for the V1 group particularly at higher income levels.

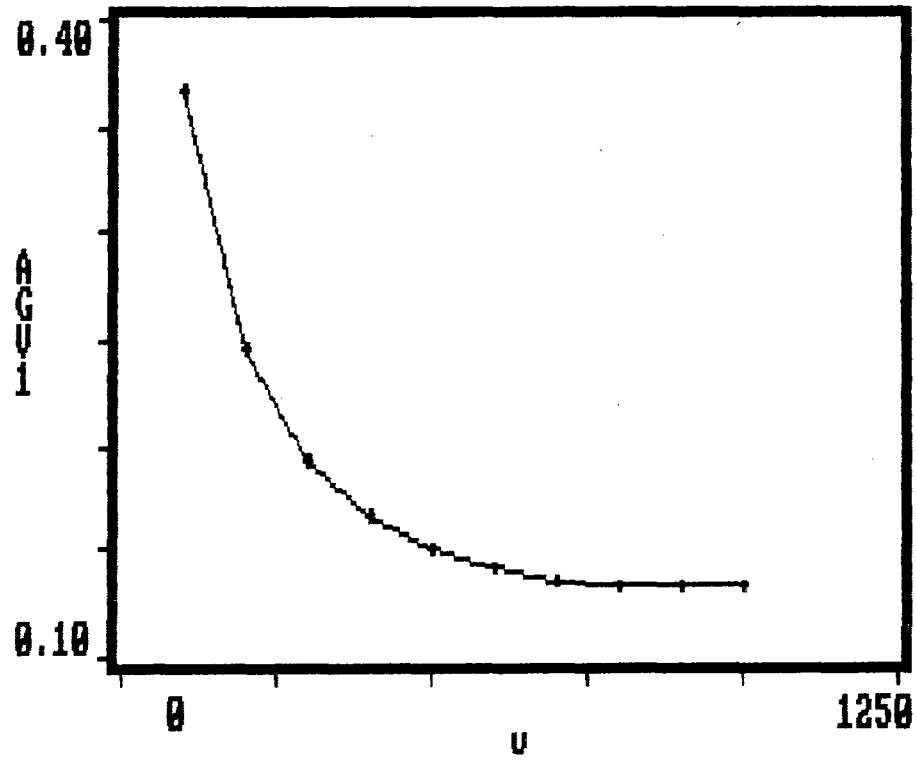
Variation of Manufacturing With Income -- V1 Group



Variation of Manufacturing With Income -- V2 Group



Variation of Agriculture With Income -- V1 Group



Variation of Agriculture With Income -- V2 Group

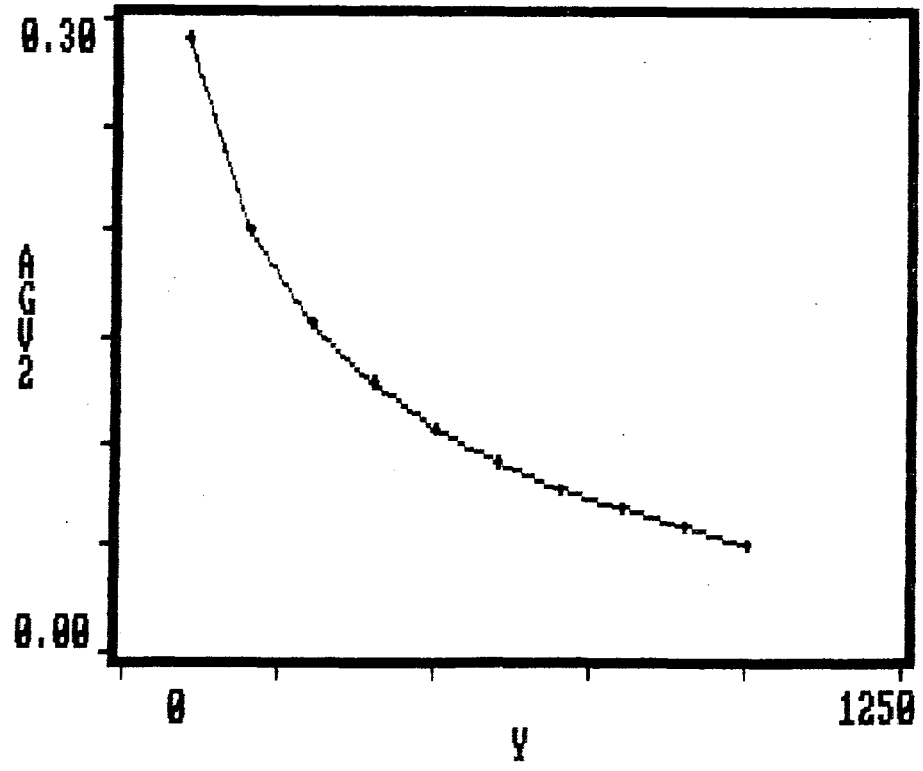


Table 7

Classification of Countries by Production Orientation:

P	I
P: Agricultural Orientation	I: Industrial Orientation
Bolivia	Algeria
Congo	Chile
Ivory Coast	Indonesia
Ecuador	Jamaica
Gabon	Jordan
Greece	Peru
Guyana	Trinidad & Tobago
Iran	Venezuela
Iraq	Zaire
Kenya	Zambia
Libya	Zimbabwe
Liberia	
Madagascar	
Malaysia	
Mauritania	
Nigeria	
Panama	
Saudi Arabia	
Sierra Leone	

1 PO Index is defined as $PO = (VA - VI) - (\hat{V}A - \hat{V}I)$

Agricultural bias for PO greater than zero
Industrial bias for PO less than zero.

3. The V2 group also also showed a somewhat greater level of construction activity. This is again in keeping with the Dutch Disease theory.

Effects of Bias in Production :

The sample of mineral economies were also analysed according to the production bias of the non-mineral economy. This index was broadly used to indicate the relative importance of the industrial sector vis a vis the agricultural sector. Segmentation of the economies by this index aimed to establish broad difference in the pattern of change arising from differences in development strategy. Also the extent to which differences in development policy towards industry can mitigate the effect of the Dutch Disease on this sector. The list of countries classified on the basis of the PO index is given in Table 7. The segmentation of the sample into the P and I groups was significant for all the process. (The F statistics at 95% level along with the equations are given in Table 8).

The signs of the coefficients were by and large as expected. The Vm coefficient was highly significant and negative for manufacturing and agriculture for both groups. The Vm coefficient was not significant for construction for the P group

Table 7a

Segmentation by Production Orientation Regression Equation

Share	Sample size	C	Log Y	$(\text{Log Y})^2$	Log N	$(\text{Log N})^2$	F	VM	R^2	SEF	F_{ratio}
Industry											
1) I	252	-.559	.2246	-.0155	.0158	.00114	.111	-.214	.627	.0374	
		(-4.4)	(5.17)	(-4.23)	(2.12)	(.6)	(3.78)	(-10.4)			57.93
2) P	329	-.742	.276	-.02	.0118	-.0113	.0141	-.162	.594	.0304	
		(-7.0)	(7.6)	(-6.5)	(2.7)	(.99)*	(.758)*	(-12.03)			
Manufacturing											
1) I	249	-.185	.0863	-.00484	.025	.0024	-.0036	-.272	.585	.0354	
		(-1.54)*	(2.09)	(1.4)*	(3.56)	(-1.32)*	(-1.29)*	(-13.95)			36.67
2) P	308	-.545	.201	-.015	.0152	-.002	.0021	-.183	.5184	.032	
		(-4.64)	(5.06)	(-4.44)	(3.21)	(-1.62)*	(.094)*	(-12.16)			
Construction											
1) I	249	-.352	.129	-.0097	-.0075	.0031	.148	.0565	.303	.0276	
		(-3.75)	(4.0)	(-3.58)	(-1.37)*	(2.24)	(6.83)	(3.72)			8.3254
2) P	304	-.193	.074	-.005	-.0077	.00184	.018	.018	.2658	.0225	
		(-2.34)	(2.65)	(-2.063)	(-32.29)	(2.142)	(1.17)*	(1.68)*			

Share	Sample size	C	Log Y	$(\text{Log Y})^2$	Log N	$(\text{Log N})^2$	F	VM	R^2	SEF	F_{ratio}
Manufactured Exports											
1) I	222	-.24 (-1.92)*	.1203 (2.85)	-.01 (-2.84)	-.056 (-8.05)	.0089 (5.06)	-.015 (-.559)*	-.083 (-4.36)	.4501	.0323	
2) P	295	.0762 (.562)	-.0142 (-.311)*	.0009 (.23)*	.0135 (2.56)*	-.0048 (-3.51)	.08 (3.5)	-.0016 (-.0102)	.103	.0342	
Agriculture											
1) I	251	1.68 (14.23)	-.47 (-11.54)	.0335 (9.9)	.038 (5.2)	-.0079 (-4.5)	-.037 (-1.3)*	-.128 (6.7)	.87	.0348	
2) P	334	1.33 (7.21)	-.291 (-4.61)	.017 (3.23)	.0008 (.1086)*	3.755 (.0193)	-.045 (-1.38)*	-.229 (9.74)	.684	.0532	43.29

(t ratios's in parentheses).
P = Primary Oriented Countries I = Industrial Oriented Countires
* Note significant at 95%

Table - 8

Variation with Income Segmentation by Production Orientation (%)

Process	$100	$200	$300	$400	$500	$800	$1000	Total Change
Industry								
1. Overall	14.12	18.28	20.2	21.36	22.13	23.36	23.8	9.68
2. I	15.2	20.1	22.3	23.59	24.4	25.58	25.9	10.7
3. P	10.26	15.6	17.88	19.1	19.8	20.69	20.7	10.44
Manufacturing								
1. Overall	12.38	14.46	15.45	16.1	16.46	17.16	17.42	5.04
2. I	10.5	13.13	14.47	15.32	15.9	17.1	17.5	7
3. P	6.05	9.72	11.2	11.94	12.4	12.75	12.7	6.65
Construction								
1. Overall	4.08	6.1	7.04	7.59	7.94	8.51	8.08	4.6
2. I	4.71	7.0	7.9	8.32	8.6	8.73	8.7	4.0
3. P	4.0	5.8	6.6	7.1	7.4	7.91	8.1	4.1
Manufactured Exports								
1. Overall	2.7	2.5	2.48	2.48	2.5	2.62	2.7	-
2. I	.38	1.8	2.2	2.2	2.2	1.7	1.3	-.92
3. P	3.8	3.4	3.2	3.1	3.04	2.91	2.86	-.94
Agriculture								
1. Overall	32.6	22.93	18.2	15.2	13.1	9.4	7.99	-24.61
2. I	26.5	17.1	13.13	11	9.7	8.07	7.82	-18.64
3. P	32.56	24.3	20.2	17.7	15.92	12.75	11.52	-21

Predicted values use equation 1.2 PCGDP in US$ 1964, F = Average for the group, Vm = Average for the group

whereas it was seen to exert a positive effect for the I group.

Variation in the Pattern with Income :

As expected the share of industry for the P group lagged behind the I group by 3-4%, with the width of the lag increasing with income. This pattern was even more clearly evident for manufacturing. The share of manufacturing for the P group lagged behind the I group by 5-6% throughout the transition (Ref. Table 9) and also see fig. 5 and 6. The share of manufacturing for the P group showed a distinct tendency to stagnate after $500 whereas for the I group there was a slow but steady increase. Despite this, the share of industry for the I group was only 26% at $1000 which is considerably below the C & S norm of 35% for this income level.

The pattern for the construction sector was similar for both the groups, with the I group showing a slightly higher share. Thus the stagnation in the share of industry for the P group is therefore attributable to the stagnation of the manfacturing sector as both groups had similar levels of construction activity. It therefore, appears that the

I group of countries have followed policies which have encouraged the development of the manufacturing sector and they appear to have alleviated some of the negative effects of the boom on this sector. However, the share of industry even for this group was still considerably below the Chenery and Syrquin norms, implying that Government policies were only partially able to mitigate the inhibiting effect of the Dutch Disease on this sector. The larger size of the manufacturing sector for the I group did not appear to have helped the share of manufactured exports which stagnated at very low levels for this group. The following are the main points emerging from this section :

1. The I group of countries as expected showed relatively healthier industrial sectors. This was due to a superior performance of the manufacturing sector vis 'a vis the P group, of countries as the share of construction was broadly similar for both groups.

2. The agricultural performance of the P group was superior to that of the I group.

3. The healthier manufacturing sectors for the I group did not appear to have led to stronger

manufactured exports which stagnated at low levels for both groups.

The worse performance of agriculture as well as manufactured exports suggests that many of the countries in the group had followed policies of domestic import substitute industrialization. The effect of stagnation of agriculture was greater for these countries. Clearly, the lower shares of this sector reflect the adverse effects of the Dutch Disease which in this case were not offset by favourable Government policies.

Effect of Scale

The sample was also divided into small economies with population less than 8 million and medium economies with population greater than 8 million. Very small economies are likely to be very open and highly dependent on trade. For this group substantial industrialisation is only feasible with export led growth. For the more medium sized countries the domestic market does offer some scope for the development of industry. The highly open nature of the small group also makes the tradeable sectors is these countries more vulnerable to the adverse influence of the Dutch Disease.

Table 10

Classification by Size

Small Countries : Population Less than 8 million	Medium Countries : Population greater than 8 million
Bolivia	Algeria
Ivory Coast	Chile
Ecuador	Congo
Gabon	Greece
Guyana	Indonesia
Jamaica	Iran
Jordan	Iraq
Liberia	Kenya
Libya	Malaysia
Madagascar	Morocco
Mauritania	Nigeria
Panama	Peru
Saudi Arabia	Venezuela
Sierra leone	Zaire
Trinidad & Tobago	
Tunisia	
Zambia	
Zimbabwe	

Source : International Financial Statistics

The list of countries falling into the two groups is given in Table 10. Segmentation of the sample was found to be significant for all the processes, considered. The F tests for there are presented in Table 11. The equations for the various sectors showed the expected sign.

Variation in the Share With Income :

As expected the share of industry for the small group (S) lagged behind that of medium countries. This phenomenon was more obvious at the higher income levels (above $ 600) when the share of industry of the S group stagnated wheareas the share for the M group continued to increase. Analysis of the manufacturing sector showed that the share for the S group stagnated at 12.5% beyond $300 whereas the share for the M group increased steadily to 18% at the end of the transition. The behaviour of the construction sector was surprising as the S group showed higher levels throughout the transition. Clearly, the relative similarities in the share of industry for the two groups arises from the greater level of construction activity for the S group.

The agricultural sector for the S group also appeared to be more severely affected, with a steep decline in share from 33.6% to 4.8% over the

Table - 9

Segmentation by Size - regression equation

Share	Sample size	C	Log Y	$(\text{LogY})^2$	Log N	$(\text{LogN})^2$	F	VM	R^2	SEF	F ratio
Industry											
1) Medium	265	-.581	.2586	-.0171	-.0903	.0191	.0132	-.285	.549	.0441	
		(-4.82)	(5.69)	(-4.4)	(-2.5)	(3.76)	(.337)*	(9.0)			
											9.53
2) Small	316	-1.142	.402	-.03	.01102	.0082	.071	-.151	.5032	.494	
		(-6.04)	(6.4)	(-5.66)	(1.557)*	(1.80)*	(3.1)	(-9.2)			
Manufacturing											
1) Medium	262	- .144	.127	-.007	-.131	.02	-.0584	-.264	.5804	.0356	
		(1.44)*	(3.4)	(-2.2)	(-4.55)	(5.15)	(-1.84)*	(-10.2)			
											14.15
2) Small	295	-.695	.262	-.021	-.012	.0155	-.0042	-.166	.434	.0389	
		(-3.27)	(3.7)	(-3.52)	(-1.2)*	(3.4)	(-.168)*	(-9.44)*			
Construction											
1) Medium	261	-.414	.127	-.0097	.036	-.0026	.073	-.0151	.295	.0232	
		(-6.47)	(5.29)*	(-4.72)	(1.9)*	(-.92)*	(3.54)	(-.899)*			
											12.78
2) Small	292	-.507	.1601	-.1076	.0232	-.0087	.089	.0209	.3586	.0252	
		(-3.7)	(3.5)	(-2.83)	(3.7)	(-2.9)	(5.48)	(1.8)			
Agriculture											
1) Medium	266	1.46	-.352	.0221	.049	-.011	-.024	-.233	.728	.0567	
		(9.5)	(-6.05)	(4.43)	(1.07)*	(-1.6)*	(-.475)*	(-5.71)			
											10.78
2) Small	319	2.093	-.526	.0347	-.06	.0211	-.074	-.139	.7102	.051128	
		(8.732)	(-6.56)	(5.18)	(-4.76)	(3.63)	(-2.49)	(-6.54)			

(t ratio in perentheses)
Small : Population was them eight million Medium : Population greater than eight million
* Not significant at 95%

Table - 10

Variation with Income Segmentation by Size

Share	$100	$200	$300	$400	$500	$800	$1000	Total Change
Industry								
Medium	10.3	16.5	19.4	21.1	22.2	24.02	24.62	14.32
Small	9.13	16.1	19.6	21.16	22.0	22.86	22.8	13.67
Manufacturing								
Medium	7.2	11.2	13.3	14.6	15.5	17.2	17.85	10.75
Small	6.4	10.4	11.84	12.5	12.7	12.5	12.1	5.7
Construction								
Medium	3.2	5.4	6.2	6.62	6.82	6.9	6.8	+3.6
Small	2.35	6.06	7.75	8.73	9.4	10.4	10.68	8.33
Agriculture								
Medium	32.9	23.63	19.2	16.5	14.6	11.42	10.25	-22.65
Small	33.6	20.91	15.03	11.55	9.3	5.5	4.3	-29.3

Predicted shares use equ 1.2

transition whereas the M group showed a more moderate decline from 33% to 10%.

The main findings emerging from this section are

1. The effect of scale appeared to be of some importance for the development of the manufacturing sector. This is in keeping with the premise that substantial industrialisation in small countries can only take place for export markets as the scope for import subsititution is relatively limited.

2. The more adverse performance of the agricultural sector for the S group along with the highly open nature of these economies suggests that the adverse effect of the real appreciation on tradeables particularly agriculture is likely to be more severe. The greater share of construction activity for these countries also provide some support for this hypothesis.

CHAPTER III

THE EFFECT OF DEVELOPMENT POLICIES ON THE PATTERN OF STRUCTURAL CHANGE

CHAPTER THREE

INTRODUCTION

The earlier chapter had examined the average pattern of structural change for a group of mineral economies. This chapter aims to examine the policy responses of the Government to increased revenues. The implications of these responses are analysed in the context of Dutch Disease theories and as well as their impact on the future pattern of growth. The first part of this chapter briefly examinesthe basic policy responses of the Governments to the increased revenues. Systematic deviations from the average pattern are hypothesized to arise from differences in resource endowments and development policies. Part II therefore analyses the deviations from the average pattern of resource allocation in terms of policy factors and natural resource endowments. Essentially we are trying to assess the importance of Government policies leading to deviations from the average pattern. Part III looks at the actual pattern of structural change for individual countries[1]. Trends in

---

1. The following countries are not considered, as the size of the mineral sector in these countries was too small to have any significant effect on resource allocation: Greece, Ivory Coast, Panama, Kenya.

export composition and the real exchange rate were also analysed to get an idea of how these countries were behaving.

The broad development objectives of most mineral economies are similar to those of other developing economies.Their major objective has been to achieve the growth and development of the non-mining economy as quickly as posssible. The existence of an important mineral sector, therefore, substantially relaxes the fiscal and foreign exchange constraints facing most other developing economies. The range of options available to the Governments of these countries range from investment in the acquisition of foreign claims (i.e. saving of mineral revenues) to investment in domestic capital accumulation, and increases in public consumption. The findings of this chapter suggest that most mineral economies have shown higher levels of both domestic capital formation and current consumption expenditures. The tendency for increased absorption was also reflected in the higher shares of imports in GDP for these countries.

The Sectoral allocation of the increased expenditures has important implications for both the spending effect of the boom and future growth and

development of the economy. A large component of both consumption and investment expenditures were accounted for the by the Government. The bulk of Government investment was concentrated in the development of infrastructure and public utilities. In the short-run, this is likely to have a major effect on the demand for construction activities. There was also increased expenditures on social services. Again to large extent these are likely to impinge on the non-tradeables sector. Thus the evidence suggests that on the whole in most mineral economies Government expenditure was biased towards consumption of non-tradeables.

Government expenditure on industry appeared to be lower than on agriculture. In most countries a large amount of public sector investment was in the resource sector. Many of the countries continued to have fairly high levels of protection to the domestic import competing manufacturing sector.

We then try to assess the effect of some of these policy responses on the pattern of structural change. Deviations from the average pattern were calculated. Policy factors were found to be much less important in explaining deviations for the agricultural sector then for industry. Within the Industrial sector the

influence of development policy on the two sub-sectors was some what different. Broadly, the findings suggest that the GDI rate was highly significant in explaining overprediction of the construction sector. Whearas movements in the real exchange rate appeared to be important in explaining deviations from the manufacturing sector. A tendency towards a depreciation leading to over-prediction of this sector. This accords with the prediction of the Dutch Disease theories. The lack of significance of manufactured exports in explaining deviations from the manufacturing sector confirmed the view that a large number of countries were following protectionist policies. Thus countries with larger manufacturing sectors did not appear to be associated with better export performance.

The findings were further confirmed when individual country deviations from predicted shares were examined in Part III. Analysis of deviations from the average structure, trends in export composition, and the real exchange rate further allowed us to characterize the development experience of different countries. Thus for e.g. the major oil exporters (Iran, Iraq, Saudi Arabia etc.) showed severe shortfalls

in both tradeables from predicted shares. These countries also showed highly appreciated exchange rates,and negligible non-mineral exports. These countries probably showed acute symptoms of the Dutch Disease. Some countries showed relatively larger manufacturing sectors (Ecuador, Indonesia, Venezuela) but manufactured exports for these countries remain negligible suggesting that most of the development was concentrated in the import competing sector. This is also supported by their adverse agricultural performance. Severe disruption of agriculture and agricultural exports was shown by a large number of countries. This was particularly marked for Algeria, Congo, Gabon, Guyana, and Nigeria) - all of which had important agricultural exports at the beginning of the period and which subsequently declined sharply.

Amongst the smaller mineral countries the pattern was less clear cut. Although most of them showed some decline in agricultural exports, they managed to maintain their level of agricultural exports. These countries were also more successful in developing manufactured exports. The degree of real appreciation shown by these countries was also much more modest. The above are in brief, the main findings of this chapter.

PART I

SECTION I

The existence of a large mineral sector, substantially relaxes fiscal and foreign exchange constraints facing most other developing economies. This section examines the policy response of these countries to the increased revenues. A major choice facing the Government is the allocation of the increased quantum of revenue between current consumption and investment. With regard to investment, it has a choice between accumulation of claims against foreign countries or investing in real domestic capital formation. The split between consumption and investment has important repercussions on the future growth prospects of the economy. A major objective of most of the mineral economies was to achieve the development and diversification of the non-mining economy within the period in which mining revenues were available.

The Government is likely to play a central role in determining the spending effect of a mineral boom. This is because in most mineral economies the Government is a major recipient of mining revenues. This section looks at trends in the shares of Government revenue and expenditures. Trends in

Government consumption and gross domestic investment (GDI) are also examined. To aid comparison, Chenery-Syrquin type equations were also estimated for the share of Government consumptions and the GDI. This allows us to compare broadly the expenditure pattern of mineral economies with that of the group of developing economies as a whole.

Trends in Government Revenue :

The findings suggests that the Government in these countries were somewhat less resource constrained, and therefore to that extent would be able to participate to a greater extent in economic activity. Table 1 shows the shares of Government revenue in GDP for selected years. The share increased for all mineral economies over the period 1967-80. Countries with particularly high shares of Government revenue were Jordan, Guyana, Congo and Mauritania - all of which had shares above 30%. The Chenery - Syrquin norm share at $1000 per capita income level was 28.7%. Thus it is likely that many mineral economies had shares of Government revenue which were considerably higher than those predicted by the Chenery - Syrquin norms shares.

Ofcourse socio-political factors play an important role in determining the level of Government

Table 1

Trends in Government Revenue (%)

Large Countries V2	1967	1970	1973	1975	1977	1979	1980-81
Algeria	23.2	26.9	29.8	-	-	-	-
Congo	22.4	21.4	-	29.1	26.6	44.3	-
Ecuador	9.4	10.6	12.8	11.9	9.9	9.9	11.3
Gabon	20.7	21.5	24.00	36.2	26.4	42.7	40.3
Guyana	23.3	25.1	27.3	42.4	33.7	35.00	41.7
Indonesia	6.7	9.8	13.3	17.2	18.1	20.5	21.3
Iran	20.2	19.6	19.4	46.3	32.0	28.0	-
Iraq	26.9	30.3	42.3	-	-	-	-
Liberia	14.6	16.3	18.0	17.8	20.8	20.0	22.7
Libya	29.5	38.7	40.7	-	-	-	-
Mauritania	11.2	14.0	15.2	37.2	36.8	30.4	-
Nigeria	11.7	10.1	20.8	22.4	21.0	-	-
Saudi Arabia	33.9	34.3	32.6	-	-	-	-
Trinidad & Tobago	17.8	20.0	19.8	-	40.3	37.3	43.8
Venezuela	21.1	22.7	21.6	28.6	29.0	33.0	31.6
Zaire	-	16.4	15.6	13.4	11.0	13.2	15.0
Zambia	28.2	34.8	23.5	28.43	25.1	22.3	25.0
Small Countries VI							
Bolivia	11.1	12.2	-	11.7	11.9	9.4	-
Chile	19.2	21.9	29.1	34.8	30.2	32.7	32.0
Jamaica	13.6	18.6	-	26.2	24.9	26.9	31.7
Jordan	-	17.7	21.7	55.7	50.4	51.3	42.8
Madagascar	14.6	15.6	18.2	15.6	26.7	28.3	19.3
Malaysia	18.7	22.4	21.0	21.7	23.0	22.2	-
Morocco	15.5	18.1	16.7	26.0	24.5	25.1	22.5
Peru	16.5	14.2	-	13.7	13.8	15.6	16.9
Sierra Leone	14.1	16.3	16.3	17.0	16.0	17.0	17.1
Tunisia	21.1	22.7	21.6	28.6	29.0	32.6	31.6
Zimbabwe	-	-	-	22.7	26.2	21.6	26.0

Source : World Tables Various Issues

intervention in economic activity. In Algeria for example, the bulk of the industrial sector was in the public sector, whereas in Ecuador the Government's activities were limited to the traditional functions of administration, defence, and provision of infrastructure. Nevertheless, Gelb (1985) in a study of eight oil exporting economies finds a substantial expansion in the size of the public sector and an increasing trend towards direct participation in industry by the Governments.

Trends in Governemnts Consumption

Most studies on the impact of a mineral boom or even the effect of substantial foreign aid inflow have noted the tendency for an increase in the resources devoted to current consumtpion expenditures. Forsyth (1985) examine the implication of a large increase in revenue accruing to the Government.[2] Essentially, the advent of a mineral boom makes available a low cost source of funds to the Government. They define cost of revenue in terms of the distortions introduced into the

---

2. Forsyth, P. J. (1985) "Booming Sector and Structural Change" in Neary, J. P. and Van Wijnbergen, S. Natural Resources and the Macroeconomy. (Basil Blackwell).

Table 2a

Share of Government Consumption and GDI Government Consumption (%)

	1965	1970	1980
Mineral Economies	13.15	14.56	17.24
Developing Economies	9.8	12.1	13.00
- Low Income	10.3	11.1	10.7
- High Income	9.7	12.3	13.5

Table 2b

Gross Domestic Investment (%)

	1965	1970	1980
Mineral Economies	19.1	21.4	27.6
Developing Economies	16.7	21.3	26.2
- Low Income	17.2	16.4	22.2
- High Income	16.6	22.7	27.0

Source : World Tables

system when funds are raised by taxation[3]. The marginal cost of public provision of goods and services is lowered vis a vis private provision. Thus we should observe a shift towards greater public provision of goods and services. The analysis for the sample mineral economies also finds a clear a tendency towards increased Government consumption by mineral economies. Particularly the lower income countries in the samples appeared to be showing levels of Government consumption which were considerably above the predicted norms for countries with similar income and population.

The category of Government consumption includes all current expenditures for purchases of goods and services, wages and salaries of employees and expenditure on defence. A comparison of the average shares of Government consumption in GDP for the sample economies vis 'a vis developing economies as whole, validates the tendency of mineral economies to have higher levels of Government expenditure. (Table 2[a])

A Chenery - Syrquin type equation for the share of Government consumption in GDP was estimated for the

---

3. Governments normally rely on distortionary taxation so that the marginal cost of raising $ 1 will normally exceeds $1. See Findlay and Jones (1982).

period 1966-1985. The inclusion of the VM coefficient in this equation was found to be highly significant with a postive coefficient. Thus, the existence of a mineral sector appears to exert a positive influence on Government consumption. Predicted values of the mineral economies share of Government consumption using the equation 1.1 (without the VM terms) with income were compared with the Chenery - Syrquin norm shares. (Ref. Table 3 and 4).

The results showed that mineral economies had higher levels of government consumption than the Chenery - Syrquin norms at each income level. The increase in share for mineral economies was particularly marked at lower income level. Thus between per capita income $100 - $300, the share increased from 14.1% to 16.1% compared to a change of 13.7% to 13.5% from the Chenery - Syrquin equation for the same range. The rate of increase over subsequent income levels for mineral economies was slower with a tendency for the share to stagnate at 16%.(Ref.Table 4)

The actual shares of Government consumption for the periods 1960-70 and 1970-80 are shown in Table 5. Countries showing particularly high levels of Government consumption in the latter period were

Table 3

Regression Equations for Government Consumption and GDI

Process	C	Log	$(LogY)^2$	Log N	$(LogN)^2$	F	VM	R^2	SEF	Sample Size
Government Consumption										
1.1	-.0854 (-.803)*	.0865 (2.4)	-.007 (-2.3)	-.0021 (-3.9)*	-.0024 (-1.7)*	.0927 4.18		.171134	.052	582
1.2	-.074 (-.705)*	.0803 (2.23)	-.00693 (-2.27)	-0044 (.803)*	-.0039 (-2.79)	.1418 (5.57)	.07325 (4.3)	.1966	.0512	582
Gross Domestic Investment										
1.1	-.804 (-5.2)	.3297 (6.2)	-.025 (-5.5)	-.054 (-7.06)	.0142 (7.17)	-.1975 (6.3)		.231	.0753	585
1.2	-.784 (-5.17)	.32 (6.14)	-.024 (-5.51)	-.043 (-5.6)	.0117 (5.84)	.282 (7.98)	.1214 (4.95)	.2623	.0738	585

Figure in Parentheses are t statistics
* not significant at 95%

Note : Equations estimated for the period 1966-85 and excluding Iran and Iraq.

Table - 4

Variation of Government consumption and GDI with Income (%)

Process	Predicted Values at Different Income Levels $100	$200	$300	$400	$500	$800	$1000	Total Change
Government Consumption								
1. Mineral Economies	14.65	15.74	16.1	16.2	16.14	15.9	15.64	.99
2. Chenery* Syrquin	13.7	13.4	13.5	13.6	13.8	14.4	14.8	.7
GDI								
1. Mineral Economies	14.75	20.7	23.03	24.22	24.9	25.4	25.3	10.55
2. Chenery* Syrquin	15.8	18.8	20.3	21.3	22	23.4	24	8.12

* Ref. Chenery and Syrquin 1975 Table 3 p. 20-21.
Predicted shares use eqn 1.1

Guyana, Libya, Iran, Zambia and Mauritania -- all of which had large mineral sectors.

Trends in the GDI :

The large increase in the mineral revenues accruing to the government as well as the high priority accorded by them to the rapid development and diversification of the non-mining economy, leads us to expect a substantial increase in domestic capital formation, particularly in the public sector. Infact, the study finds a sharp acceleration in the rate of investment at lower income levels, suggesting that the advent of a mineral boom relaxes fiscal and foreign exchange constraints particularly for the lower income countries, and therefore allows the countries to embark on more ambitious development programmes. The average GDI for mineral economies for the three years 1965, 1970 and 1980 was found to be slightly above the average for developing economies as group. Between 1970 to 1980 there was a large jump in the rate of investment for these countries (from 21.4% to 27.6%) Ref. Table 25.

A Chenery - Syrquin type equation for GDI was estimated for the period 1966 - 85. Inclusion of the

Vm term in the equation was highly significant and exerted a positive effect on the GDI. The variation in rates of GDI using equation 1.1 (without the Vm term) with income were compared with the Chenery - Syrquin norms. (Table 3 and 4).

The basic pattern of the accumulation processes was similar to that shown by the Chenery - Syrquin study i.e. a sharp acceleration in the early phases followed by a tendency to taper off at higher income levels. The GDI for the mineral group was greater than the norm GDI at all income levels, with the rate of increase in share being particularly marked at the lower income levels. For example between $100 - $400, the GDI for mineral economies increased by nearly 10% from 14.5% to 24.2%, compared to from 15.5% to 21.3% for the Chenery - Syrquin norm over the same range. The GDI rate stabilised at about 25% for mineral economies compared to around 23% for the Chenery - Syrquin norm.

The average GDI for the sample economies for the periods 1960-70 and 1970-81 are presented in Table 5. Almost all the large mineral sector countries showed investment rates above 25% in the latter period. Countries with particularly high rates of investment

were Algeria, Congo, Mauritania, Guyana, and Venezuela, Several of the Countries with smaller mining sectors also showed high rates of investment (Jordan, Malaysia, Tunisia). Most of the lower per-capita income countries (Jordan, Guyana, Liberia, Mauritania etc.) showed rates of investment above 25%. For this group the mining sector clearly relaxed the resource constraint which would otherwise have been faced by these countries. (Ref. table 5)

So far we have seen that the mineral economies by and large had both higher levels of Government consumption and investment. This was particularly marked for the lower income countries in the sample, suggesting that for these countries the existence of a mineral sector substantially relaxes the fiscal constraint. However, Gelb (1985) notes the sharp increase in both current and capital expenditure has not been as beneficial as expected.[4] The general acceleration of activity mostly in the Government sector tends to overload the administrative circuits as well as the transport and communications networks, so that the system is more prone to breakdowns. He also

---

4. Gelb, A.H. (1985), Adjustment to Windfall gains' in Neary, J.P. and Van Wijnbergen, S. (ed). Natural Resources and the Macroeconomy. (Basil Blackwell)

Table 5

Trends in Government Consumption and GDI as a share of GDP (%)

Large Countries V2	Government Consumption		Gross Domestic Investment	
	1960-70	1970-81	1960-70	1970-81
Algeria	15.1	14.8	30.1	42.9
Congo	15.9	16.1	31.1	31.4
Ecuador	10.0	13.7	15.6	25.5
Gabon	12.4	12.2	38.0	42.6
Guyana	14.4	24.2	21.9	29.1
Indonesia	7.9	10.6	11.1	20.2
Iran	13.3	20.4	17.5	27.1
Iraq	19.6	-	16.1	27.9
Liberia	11.6	14.0	25.1	26.1
Libya	16.7	24.1	25.6	26.0
Mauritania	18.3	28.5	27.5	31.1
Nigeria	7.1	10.1	15.4	26.2
Saudi Arabia	18.5	19.2	16.9	23.3
Trinidad & Tobago	10.6	-	20.3	28.0
Venezuela	12.6	13.6	24.1	30.8
Zaire	22.3	18.0	22.2	27.9
Zambia	14.3	25.3	26.1	27.0
Small Countries V1				
Bolivia	9.2	11.2	15.5	17.7
Chile	11.5	13.5	15.8	19.5
Jamaica	9.0	19.1	30.1	20.5
Jordan	-	33.7	-	35.7
Madagascar	21.7	16.8	12.9	17.2
Malaysia	14.2	17.0	18.1	26.1
Morocco	12.3	18.6	12.3	23.8
Peru	11.2	12.4	18.8	17.0
Sierra Leone	9.2	10.6	13.6	13.6
Tunisia	12.6	13.6	23.1	28.2
Zimbabwe	12.0	16.0	15.9	21.0

Source : World Tables Various Issues

notes of the general tendency towards increased wasteful expenditure in these countries. Investment in large and complex public project led to many attendant problems, as most of these projects were inadequately prepared and assessed. The complex nature of technology involved meant that domestic agencies were slow to detect and correct faults. This led to problems and delays in operation and cost over - runs. Rising costs of construction were a major contributory factor to cost over - runs. Most of these problems can be attributed to the sudden sharp increase in investment activity, a large part of which was concentrated in the Government sector which was already over burdened.

All of this suggests, that the sudden increase in activity strains the absorptive capacity of the economy. Wijnbergen and Martin (1985) explicitly introduce an absorptive capacity variable in a model which examines allocation of mineral revenues is an intertemporal framework.[5] The absorptive capacity constraint is modelled as a decline in the productivity of investment, if the level of capital accumulation in a particular period exceeds a critical

---

5. Van Wijnbergen, S. and Martin, R. (1985) Shadow Prices and Oil Revenues in Egypt in Neary, J.P. and Van Wijnbergen, S. (eds). Natural Resources and the Macroeconomy. (Basil Blackwell).

level determined by the rate of technical progress, the growth of labour force, and the level of investment in the earlier period. The existence of such a constraint results in a much lower increase in the optimal level of investment in the initial period. The existence of such a limit may explain why the sharp increase in investment in mineral economies has not had the expected benefits in terms of productivity and growth. This particularly applies to the oil exporters, many of which went in for large-scale development programmes after the oil price increase in 1973. Gelb (1985), is of the view, that many of the oil exporting economies would have been better off investing more of the oil windfalls abroad rather than going in for large increases in public investment.

SECTION II

The Sectoral Allocation of Government Expenditure:

This section examines the sectoral allocation of the increased expenditure. The extent to which the increased expenditure is directed towards the non-tradeable sector is an important determinant of the degree of real appreciation caused by the mining boom. The increase in real income from the boom also increases the demand for tradeables, so that the extent

of access to freely available imports is also be an important factor affecting the impact of the spending effect of the boom.

As noted earlier, the increase in expenditure by the Government is likely to be a major source of the spending effect from mineral revenues. The bulk of Government spending on both current consumption and investment is likely to impinge on the non-tradeable sector, particularly construction and services. Government expenditure on social services is also likely to raise demand for services as well as construction.

Broadly the two major categories of government expenditure are social services and economic services. Economic services include expenditure on agriculture, industry, transport and communications and public utilities. The allocation between these two categories is clearly dependent on socio-political factors. Countries which stressed provision of social services were; Bolivia, Ecuador and Chile. Whereas countries with fairly high shares going to economic services were Nigeria Zambia, Trinidad and Tobago and Liberia. (Ref. table 6)

Table 6

The Sectoral Allocation of Government Expenditure in 1981 as a Proportion of Total Government Expenditure (%)

Large Countries V2	Social Services	Economic Services	Economic Services		
			Agriculture	Industry	Infrastructur
Algeria	-	-	-	-	-
Congo	33.6	20.9	3.2	2.5	15.2
Ecuador	43.3	21.1	7.5	-	13.9
Gabon	-	-	-	-	-
Guyana	26.2	18.2	9.4	1.7	7.1
Indonesia	19.9	28.7	10.1	3.9	14.7
Iran	28.8	28.0	4.8	5.3	17.9
Iraq	-	-	-	-	-
Liberia	28.2	30.5	4.6	1.8	24.1
Libya	-	-	-	-	-
Mauritania	17.1	13.5	7.1	.2	6.2
Nigeria	16.1	45.8	2.6	15.2	28.0
Saudi Arabia	-	-	-	-	-
Trinidad & Tobago	29.3	31.8	3.6	.1	28.1
Venezuela	37.7	20.6	4.1	2.5	14.0
Zaire	-	-	-	-	-
Zambia	19.1	32.6	23.0	2.4	7.2
Small Countries V1					
Bolivia	46.4	18.2	2.5	1.5	14.2
Chile	63.3	11.4	1.4	2.3	7.8
Jamaica	35.3	22.8	6.7	.8	15.3
Jordan	29.6	29.8	1.4	6.4	22.0
Madagascar	-	-	-	-	-
Malaysia	32.4	20.1	7.1	.6	12.4
Morocco	27.2	27.8	6.5	1.9	19.4
Peru	21.8	29.7	7.3	1.1	21.3
Sierra Leone	20.6	25.5	4.1	1.4	20.0
Tunisia	37.0	27.3	14.3	2.1	10.9
Zimbabwe	-	-	-	-	-

Source : World Tables Various Issues.

The allocation of expenditure between agriculture, Industry, and transport and communications was also examined for the countries for which the breakdown was available. (Ref Table 6). Direct expenditure by the Government in industry appeared to be less than for agriculture in most countries, accounting for less than 5% of expenditure. Notable exceptions were Nigeria (15%), and Iran (8%). Almost all the countries showed higher shares of expenditure being allocated to agriculture. This may be because for most the sample economies, the agricultural sector is likely to be the major export sector apart from the mineral sector.

Countries with noticeably large expenditure on this sector were Indonesia, Ecuador, Jamaica, Tunisia and Zambia. Apart from Zambia all the others had important agricultural exports, (See Table 6). Direct expenditure by the Government in manufacturing was much less important in most of the countries.

Investment in infrastructure clearly accounted for the bulk of expenditure on economic services. Thus in most countries a large part of Government expenditure was undertaken to develop transport and communications and public utilities. Increased investment particularly in highly capital intensive

projects in the infrastructure sector, will increase demand for skilled labour and other resources. This will increase competition for skilled labour employed in the manufacturing sector, and will therefore put further pressure on wages in this sector. In future periods, these investments will lead to an improvement in productivity in general for the economy as well as expanding the output of the non-tradeable sector. But investment in infrastructure in the short run is likely to worsen the negative effects on profitability for the exposed parts of the manufacturing sector.

The concentration of Government expenditure in the infrastructure sector implies that direct Government investment in manufacturing would not have been substantial enough to offset the contractionary effects of the boom. Apart from this, a large part of public investment in industry was directed towards developing mineral processing industries. For example, both Algeria and Venezuela went in for large scale investments in the hydrocarbon sector. Many of the richer oil exporters also showed a marked bias in favour of development of heavy industry (Saudi Arabia, Iran, Iraq etc.). The poorer countries such as Indonesia and Nigeria were less willing to mortgage oil revenues for

large projects, but even their investments of this type were considerable.

Trends in Imports :

The advent of a mineral boom relaxes the foreign exchange constraints facing most developing economies. It is to be expected that most mineral economies would therefore, relax import restrictions to some extent to allow increased absorption of imports. Table 8a shows the average share of imports in GDP for the group of mineral economies for three years. The share of imports for mineral economies was considerably higher than the averages for developing economies as a whole for all three years. This suggests that on average the mineral economies were able to finance much greater levels of imports. Between 1965 and 1970, there was little change in the share of imports. However, between 1970 and 1981 the share jumped from 30% to 39.2%. This is probably due to the more liberal import policies followed by the oil producers after 1973.

Table 7 presents the share of imports in GDP for the periods 1960-70 and 1970-81 for the sample countries. Almost all the mineral economies showed an increase in the share of imports for the latter period.

Table 7

Trends in Share of Imports in GDP (%)

Large Countries VL	1960-70	1970-81
Algeria	31.4	36.0
Congo	60.2	57.4
Ecuador	18.7	26.1
Gabon	41.8	-
Guyana	54.9	73.0
Indonesia	15.8	22.4
Iran	15.6	25.3
Iraq	20.8	34.9
Liberia	42.3	52.8
Libya	31.9	36.3
Mauritania	36.8	66.7
Nigeria	17.4	23.9
Saudi Arabia	27.3	31.7
Trinidad & Tobago	35.2	36.5
Venezuela	18.9	26.9
Zaire	45.0	38.7
Zambia	38.3	41.4
Small Countries VI		
Bolivia	20.8	18.3
Chile	14.2	26.4
Jamaica	38.0	45.8
Jordan	-	43.3
Madagascar	23.1	25.2
Malaysia	39.8	47.7
Morocco	20.4	30.5
Peru	16.6	19.2
Sierra Leone	30.5	33.1
Tunisia	28.1	40.3
Zimbabwe	-	-

Source : World Tables Various Issues

Table 8a

Average Share of Imports (%)

	1965	1970	1980
Mineral Economies	31.84	30	39.2
Developing Economies	14	17.7	29.1
- Low Income	10.9	10.4	15.4
- High Income	14.7	19.7	32.0

Table 8b

Share of Food Imports (%)

	1965	1970	1980
Mineral Economies	18.4	17.8	16.1
Developing Economies	16.0	13.6	11.6
- Low Income	20.7	20.1	13.4
- High Income	15.5	12.7	11.5

Source : World Tables

Countries with very high shares of imports (above 35% of GDP) were Algeria, Liberia, Libya, Mauritania and Guyana. Most of the large mineral sector countries had imports above 25% of GDP, though Indonesia, Ecuador, Nigeria and Venezuela appeared to be following more cautious policies.

Amongst the small mining group Jamaica, Jordan, Tunisia, and Malaysia appeared to be following very open strategies whereas Bolivia, Chile, and Peru appeared to have policies which kept imports at low levels.

Thus most of the large mineral group followed fairly liberal policies in both periods. But many still continued to follow more protective policies - Indonesia, Ecuador, Venezuela and Nigeria are the most notable cases.

Manufactured imports accounted for the bulk of imports in both periods (atleast 50-60% of total imports). Many of the countries showed a tendency for food imports to increase between 1970 and 1980. Most notably Algeria, Congo, Nigeria and Venezuela. On average, the group of mineral economies had a higher share of food imports in total imports compared to the average for developing economes. Secondly, the share

of food imports declined fairly substantially between 1965 and 1980 for developing economies as a whole (from 16.4% in 1965 to 11.6%) in 1980) the reduction for the mineral economies was very small (from 18.4% in 1965 to 16% in 1980). (Ref. Table 8b).

The above analysis supports the view that the agricultural sector in most mineral economies was subject to severe pressures from the Dutch Disease. Thus the the remarkably sharp decline in the share of agriculture with income which was obtained in chapter two, is also supported by the increase in share of food imports in total imports.

The Foreign Trade Regime :

A major objective of most mineral economies has been the development of the non-mineral economy and the diversification of the export basket. Most of the countries in this group have followed policies of primary specialization but with considerable protection to the manufacturing sector. Heavy protection of the import competing sector has an important impact on resource allocation. The existence of import controls may effectively make this sector a non-tradeable and hence on balance a net beneficiary from the boom .

However, the existence of an import competing sector has well known adverse effects on the development of manufactured exports. Thus the adoption of these policies is likely to further discriminate against the export sector by creating additional reallocation of resources from the manufactured export sector to the import competeting sector

We now look at some evidence on the extent to which a protective strategy has been followed by the mineral economies. However, almost all developing economies have adopted protectionist strategies at some point in their development. Thus the extent of distortions induced by such a strategy become important. Calculation of the effective rates of protection for the sample countries was beyond the scope of this study. We have therefore utilised the results of other studies to examine the level of protection for some of the countries in the sample. Agarwala (1983) presents the estimates of the ERP's for a few of the countries in the sample.[6] The ERP rate is defined as high if its greater than 80%; low when less than 40%; and medium otherwise.Only Peru appeared to

---

6. Agarwala, R. (1981) Price Distortions and Growth in Developing Economies, World Bank Staff Working Paper No. 575.

have ERP's in the high category. Indonesia, Jamaica, Tunisia, Nigeria, all appeared to have medium ERP's. Malaysia, Chile, and Kenya had low levels of protection. In the case of Chile, before 1974, ERP's were very high, but were lowered drastically in the later period. Other countries which followed protectionist policies were Venezuela, Ecuador, Algeria, Iraq and Iran.

Another indication of the bias in the strategy is the pattern of structural change and resource allocation. Broadly, we would expect countries which offer a substantial degree of protection to domestic industry to have relatively well developed shares for this sector in GDP. On the other hand, such a strategy has an adverse effect on exports, particularly the development of manufacturing exports.

PART II

SECTION III

So far we have broadly examinedthe policy responses of the mineral economies to the increased availability of mineral resources. This part looks at the deviations of the actual pattern of change for the countries from the predicted shares. We are now interested in determining factors which lead to

deviations of the individual country pattern from the norm. In chapter two, the share of each sector was analysed in terms of the effect of per capita income, population, net capital inflow, and the share of the mineral sector in GDP. Deviations from predicted shares can therefore be hypothesized to arise from differences in development policies and initial conditions.

Regression analysis was used to analyse the effects of various structural and policy variables on deviations . The deviations were calculated using equation 1.2 which includes the effect of both capital inflows and the share of the mineral sector as well as the income and population terms. Deviations from the predicted shares were calculated for industry, manufacturing, construction, and agriculture. The deviations were calculated as: predicted shares -actual shares

Negative values of deviations, therefore indicate above norm shares for the sector. This is particularly important for the industrial sector where overprediction is likely to arise from development policy factors. The rate of investment and the foreign trade regime are likely to be important factors

influencing the size of industry and manufacturing. However, although the foreign trade regime is likely to be an important determinant of deviations, it's effect could not be incorporated in the equation.

The following are a list of possible independent variables which were considered:

The rate of gross domestic investment, the share of Government consumption in GDP, the share of imports in GDP, the share of manufactured exports in GDP, and the real exchange rate. The postulated effect of some of these variables is considered below. The basic rationale is derived from both development theory and the Dutch Disease models.

The rate of gross domestic investment (GDI):

Essentially a higher rate of GDI would be postulated to lead to over prediction of the industrial sector . As noted earlier, the rate of GDI for mineral economies was somewhat higher than for other developing economies. The available evidence from the earlier sections suggests that the bulk of this investment was concentrated in the infrastructure sector .

The share of manufactured exports in GDP:

The basic rationale for this is derived from the expectation that a higher level of manufactured exports would be associated with a larger manufacturing sector. This finding is corroborated by the findings of the Chenery and Syrquin study .

However, the strategy of import substitution is likely to break this association between size of manufacturing sector and exports. Protection of import competing industries leads to a relatively large shares of manufacturing, but the adverse effects of this strategy on manufactured exports are well known.

The real exchange rate index:

The bilateral real exchange rate with the dollar was used with 1972 as base year. Dutch Disease theory allots a central role to this variable for bringing about the structural adjustment to a boom, Essentially, a tendency towards a real appreciation would be associated with declining shares of tradeables whereas a depreciating trend would be associated with relatively larger manufacturing and agricultural sectors, Significant over prediction of either sector would therefore be associated with a real depreciation.

The base year of 1972, is taken as many of the sample economies were major oil exporters and experienced substantial windfall gains in the post 1973, period. For the non-oil mineral economies. Choice of this base year was arbitrary as many of them were mineral exportersof longstanding.

Other variables included in the equation were the share of Government consumption, the share of imports, the share of the mineral sector and net capital inflows. With regard to the last two, most of their effect on the predicted share had already been taken in account as they were both included in the equation estimating the share .

With regard to Government consumption, and share of imports, there was no clear cut theoretically expected pattern.

Results:

The equation for the deviations from industry i.e. (VINDF=VIND)is given below.

$$B1 = .0292 - .014\ Vm - .073GDI - .0241\ RER$$
$$(3.125)\ (-1.11)^{*}\ (-3.035)\ (-3.7)$$
$$+ .0342\ M + .0893EX$$

(2.24) (1.42)*

R^2 = .0612

Where SEE = .0409

Vm = share of mining

GDI = Gross domestic investment

RER = real exchange rate

M = Imports / GDP

Ex = manufactured exports to GDP

Figures in parentheses are the t statistic

* not significant at 95%.

Both the GDI and the RER were found to be highly significant in influencing the pattern of deviations for industry. Both variables had negative coefficients which was in keeping with theory. Thus higher levels of GDI led to greater negative deviations of industries (over prediction). Similarly a real depreciation (increase in the RER index) was again associated with negative deviations of industry. They both these two factors appear to have influenced the industrial sector in the predicted fashion. The negative relationship of the real exchange rate with deviations from the norm offers some support for the basic resource allocation mechanism postulated by the Dutch Disease. However,

the effect of Vm on deviations was not significant as it had already been accounted for in the earlier equations. The relationship between deviation of the industrial sector from the norm and the share of manufactured exports was not signficant.

Separate equations were also estimated for the deviations from the norms for manufacturing and construction. As noted earlier, both of these are subject to differing tendencies as the construction sector is a non-tradeable, and the manufacturing sector is atleast potentially a tradeable.

The results of the two equations are interesting as they reflect not just the differential effect of the Dutch Disease on the two sectors, but also reveal to some extent the sectoral bias of development policies.

Equations for deviations of Manufacturing:

B2 = .0045 - 0232Vm + .04GDI - .024RER + .010243 Ex + .0131M

(.498)* (-1.56)* (1.75)* (-3.81) (.214)* (.989)*

R2 = .039M

* Not significant at 95% level.

The equations for deviations from the norms for the manufacturing sector showed up many interesting tendencies. First, the most important factor affecting

deviations in this sector was the real exchange rate. This was significant with a negative coefficient, which is the theoretically expected sign. Thus a tendency towards a real depreciation was associated with greater extent of negative deviations (overprediction) of this sector.

Surprisingly, the GDI was not so important for determining deviations for this sector and in fact, it was only just significant at 92% level. The sign of the GDI coefficient was positive , implying higher rates of investment were associated with greater shortfalls of this sector from the norm. Neither manufactured exports nor imports were found to be significant.

Equation for Deviation from the norm for construction:

$$B4 = .0145 + .0024Vm - .12GDI + .0032RER + .059Ex + .022M$$
$$\quad\quad (2.65) \quad (.316)^* \quad (-7.86) \quad (.87)^* \quad (1.58) \quad (2.26)$$
$$R^2 = .148 \qquad SEE = .0235.$$

The deviations from the construction norms showed the opposite tendency. The GDI was strongly significant, with a negative coefficient. Thus higher rates of investment were associated with substantial

negative deviations (over prediction) of this sector. The real exchange rate and manufactured exports were not significant. Imports were also found to be significant in explaining deviations for the construction sector.

The relative insignificance of this factor in explaining deviations from the manufacturing suggests that there was little investment in this sector. This is in keeping with the findings of the earlier sections where in most countries direct Government investment was mainly in the infrastructure sector with a substantial proportion being accounted for by construction. The insignificance of manufactured exports as a factor influencing deviations suggests that most countries were following policies of import substitutions with relatively large manufacturing sectors developed under heavy domestic protection. As noted earlier, this policy effect of the foreign trade regime could not be included in the statistical analysis.

Finally the deviations from the agricultural norm were also regressed on the above variables (Manufactured exports were excluded as an explanatory

variable.)

$$B3 = -.0429 - .0172Vm + .06GDI - .009RER - .0547M$$

(-2.84) (-.91)* (2.36) (-.75)* (3.2

R^2 = .0687 (equation estimated without Chile)

Surprisingly the real exchange rate was not found to be significant in explaining deviations from the norm for this sector. This may be because the agricultural sector in most of the sample countries showed a strong tendency to decline over the period considered. Thus there was no clear cut tendency for the share of this sector to vary with movements in the real exchange rate.

Other important factors which appeared to affect deviations for the agricultural sector were the GDI and imports. The GDI coefficient had a positive coefficient suggesting that increases in the rate of investment were associated with a worsening of the position of agriculture.

In sum, the findings suggest that the effects of the GDI, the share of imports were more important for explaining deviations from the norms for the industrial sector than the agricultural sector. Within the industrial sector, substantial increases in investment

appear to have benefitted the construction sector. The effect of this increased volume of investment on the size of the manufacturing sector was relatively unimportant, suggesting that there was relatively little investment in this sector. This is also confirmed to some extent by the earlier sections where the bulk of Government expenditure, Deviations in this sector were strongly influenced by trends in the real exchange rate. The agricultural sector showed steep tendency to decline and therefore, though, the real exchange rate is likely to be an important influence ,deviations from this sector did not vary systematically with trends in the real exchange rate.

PART III

SECTION IV

This section examines the pattern of deviations from the norm for individual countries. The cross-sectional analysis is useful for establishing a norm or average pattern with which individual country experiences can be compared. Deviations from the average pattern would arise from differences in initial conditions, size of the mineral sector and the development strategy. The earlier section had also noted that substantial deviations in manufacturing depended on the type of foreign trade regime whereas

domestic investment led to overprediction of the construction sector.

Deviations of actual shares from the Chenery-Syrquin norms were also calculated for agriculture and industry. The main aim was to identify countries which appeared to have shares for either or both sectors close to the Chenery-Syrquin predicted share.

As expected almost all the countries in the sample showed significant shortfalls from the predicted share for both sectors. The shortfalls from the agricultural sectors were more extreme. For both sectors, countries with large mining sectors tended to show greater shortfalls - the countries showing the greatest degree of shortfalls were the major oil exporters: Iran, Iraq, Saudi Arabia and Libya. This was in keeping with the Dutch Disease. A few countries, most noticeably Indonesia, Zambia, Jamaica, Zimbabwe showed greater than norm industrial sectors. Of these, Indonesia and Zambia had large mineral sectors.

Deviations from the Mineral Economy norm:

Deviations were also calculated from the mineral economy equations. Equation 1.1 (This equation did not include the effect of Vm) was used for this purpose. The industrial sector was disaggregated into manufacturing and construction because these are subject to differing tendencies. Average deviations for the three periods 1964-72, 1973-79 and 1980-85 are shown in Table-9. On the basis of the pattern of deviations, the countries were classified into three groups. The divisions into these three groups are fairly rough with the aim being to identify broad similarities in the pattern of resource allocation on the basis of common structural and policy features.

Group 2: Countries showing significant over prediction of the manufacturing sector.

Group 1: Countries showing significant shortfalls for both agriculture and manufacturing from the norm. This category also includes countries with both sectors close to the norm shares. This is because the average pattern for mineral economies shows shares of agriculture and manufacturing considerably below the Chenery-Syrquin norm. Countries showing shortfalls for both tradeables from the mineral economy predicted

Table 9

Average Deviations of Manufacturing and Agriculture from the Mineral Economies Norms (%).

Large Countries VI	Manufacturing			Agriculture		
	1964-72	1972-79	1980-85	1964-72	1972-79	1980-85
Algeria	.51	5.32	5.00	8.30	7.80	5.80
Congo	.61	1.62	4.98	4.40	4.60	6.54
Ecuador	-6.86	-3.65	-4.35	-2.91	-.21	3.03
Gabon	3.16	2.95	-	-1.52	4.30	6.18
Guyana	-3.08	-1.8	.21	-3.19	-4.12	-2.51
Indonesia	-3.17	-3.35	-4.15	-1.65	7.30	9.30
Iran	2.14	5.75	6.43	-3.70	2.30	-2.60
Iraq	4.13	4.21	-	-.25	5.50	-
Liberia	-	3.35	4.23	-	-	-
Libya	8.72	5.55	9.90	-	12.25	-9.20
Mauritania	2.39	-	-	3.79	6.89	8.32
Nigeria	4.35	5.35	1.19	-11.3	.38	.32
Saudi Arabia	4.05	6.18	9.42	8.10	7.03	6.80
Trinidad & Tobago	.12	-3.74	3.34	2.93	2.26	2.60
Venezuela	.69	-2.25	-3.18	1.90	1.36	1.81
Zaire	-	7.50	7.40	7.57	5.50	-1.60
Zambia	1.38	-3.93	-6.30	9.40	8.50	9.60
Small Countries VI						
Bolivia	-2.50	-.87	-2.97	6.95	3.50	4.50
Chile	-10.65	-8.30	-4.53	2.82	3.77	4.20
Jamaica	-4.37	-3.99	-5.04	3.52	3.96	7.00
Jordan	3.67	-.86	-1.10	11.70	12.10	9.30
Madagascar	-2.35	-	-	1.47	-5.10	-
Malaysia	2.74	-3.18	-3.07	-11.10	-13.30	-7.86
Morocco	-3.68	-3.71	-1.86	.93	.35	.83
Peru	-4.37	-7.30	-4.50	-2.74	-.93	4.20
Sierra Leone	3.91	5.70	4.17	-1.80	-2.30	-5.68
Tunisia	4.12	2.85	2.87	3.40	-.25	1.25
Zimbabwe	-	-9.30	-8.67	-	7.02	7.06

Source : Equation 1.1

values can be hypothesized to be showing a more acute manifestation of the Dutch Disease on shares of Tradeables. Thus this group comprises countries whose Tradeable sectors appear to be showing the Dutch Disease pattern.

Group 3: Countries showing agricultural sectors which are consistently above the predicted shares. However many countries in this group had mineral sectors which were too small to have an appreciable effect on structural change i.e. Kenya, Greece and the Ivory Coast.

The countries included in the various groups are shown in Table No.10. As expected, a majority of the countries appeared to have a pattern of structural change which was either close to or fell short of the predicted norm. Countries showing significant shortfall from the norm were: Iran, Iraq, Libya, Saudi Arabia and Algeria. The mineral sector accounted for between 30% - 60% of GDP. The sheer magnitude of the spending effect of the mineral sector was likely to be very large in these countries and therefore it is likely that the negative effect of the Dutch Disease was severe enough to result in significant shortfalls from the already low norm shares. The share of

Table 10

Classification of countries by Pattern of Deviations.

Group I	Group II	Group III
Algeria	Chile	Ivory Coast
Bolivia	Ecuador	Greece
Congo	Indonesia	Guyana
Gabon	Jamaica	Kenya
Iran	Morocco	Liberia
Iraq	Peru	Malaysia
Jordan	Zambia	
Libya	Zimbabwe	
Madagascar		
Mauritania		
Nigeria		
Panama		
Peru		
Saudi Arabia		
Sierra Leone		
TTO		
Tunisia		
Venezuela		
Zaire		

construction was significantly higher than predicted for Algeria, Saudi Arabia and Libya. Infact Algeria stands out as having an exceptionally large construction sector (6-7% above predicted shares). The tendency for these countries to display above norm construction activity may to some extent reflect the switch to non-tradeable sectors predicted by the Dutch Disease. More importantly, as the previous section showed that a large proportion of the increased investment activity impinged on the construction sector. Most of the increased investment was of the form of fixed capital formations which led to large increases in the demand for construction activity. Similarly in most of these countries the bulk of the new investment was in the infrastructure sector and therefore was unlikely to mitigate the effect of the Dutch Disease on the manufacturing sector. Many of the countries e.g. Algeria, Venezuela also went in for large investments in hydro carbon industries. In other countries also, there was a tendency for large investments in the mineral sector.

Most countries in group one also showed considerably worse agricultural performance, with many countries showing substantial shortfalls, although in the earlier sub period (1964-72), many countries had

shown relatively healthier agricultural sectors, particularly Nigeria, Ecuador, and Guyana among the large mineral group. However in 1980-85 almost all the large mineral countries were showing substantial shortfalls from the mineral economy norms. The deterioration in agriculture was particularly marked for Nigeria. But for most other countries the extent of the shortfall from the norm was seen to increase over the period considered.

The decline in profitability of this sector cannot be attributed to the adverse effects of the real appreciation alone. Many countries for example, Indonesia and Ecuador experienced a steep real appreciations after 1973, but nevertheless managed to maintain relatively healthier agricultural sectors although even in these countries this sector suffered. Poor performance of agriculture has also been blamed on development policies which emphasize industrial development. Sometimes even to the detriment of this sector. For example, low producer prices for food products have acted as a disincentive to production in Nigeria, Iran, Ecuador, Congo and Chile. in many of the countries labour shortage were also seen to be an important cause of poor performance. This of course,

is one of the basic effects of the Dutch Disease i.e. the movements of labour from agriculture to the services and industrial sectors. This is obviously more important in labour scarce economies and has been cited as being important in Jamaica, Trinidad & Tobago, Guyana and Congo 4. Internal World Bank studies have also pointed out the general tendency to neglect development of agricultural infrastructure and research in this area.

Although the earlier section showed that in many of the countries a somewhat higher share of Government expenditure was allocated to agriculture (Indonesia, Guyana, Jamaica, Peru and Tunisia) . Studies have singled out the case of Indonesia has having persued a relatively more balanced development strategy between physical infrastructure, education and agricultural development . In many countries, the strategy of import substition also probably acted to worsen the performance of this sector.

Group two countries were characterised by relatively larger manufacturing sectors. Amongst countries with large mining sectors Ecuador, Indonesia, Zambia, and Venezuela stand out as having above norm manufacturing sectors. For these countries, the

development of relatively larger manufacturing sectors can be attributed to the protective import subsitution strategies adopted. The smaller mineral sector countries in this group i.e. Jamaica, Chile, Peru also had high levels of protection. Most of the countries in this group showed significant shortfalls for agriculture. The adverse performance of agriculture was particularly marked for Chile, Jamaica, and Zambia. As pointed out earlier, Indonesia and Ecuador managed to maintain moderately healthy agricultural sectors although even they showed shortfalls in the 1980-85 period.

With regard to Group three, only two countries with large mineral sectors, Guyana and Liberia showed significantly larger than norm agricultural sectors. The other countries in this group; Kenya, Ivory Coast, Greece had mineral sectors which were too small to have any appreciable effect on structural change.

Section V

This section examines trends in the composition of exports. The real appreciation of the exchange rate is likely to affect profitability of exportables adversely. Thus the manifestation of the Dutch Disease is likely to result in a decline in the agricultural

exports, particularly in countries which had had important agricultural exports. Manufactured exports on the other hand which are in the developmental stage are likely to stagnate or decline to very low levels.The adoption of import substitution strategy is likely to further exacerbate the negative effects on both exportables. Broadly, countries which had above norm manufacturing sectors but low levels of manufactured exports can be said to displaying the effects of the import substitution strategy on resource allocation.

Trends in export composition are examined for the year 1965, 1970 & 1981 (Ref Table 11a, 11b,). Agricultural exports included both food and non food categories. The manufactured exports category comprised exports of machinery and equipment and other manufactures.

Most of the countries appeared to have fairly dominant agricultural export in 1965 (on average agricultural exports accounted for atleast 35% of total exports). Ecuador, Nigeria and Indonesia appeared to be predominently agricultural exporters. The share of agricultural exports was seen to decline for all countries by 1981, the decline being particularly steep

Table 11a

Share of Manufactured Exports in Total Exports

(% of total Exports)

Large Countries V2	1965	1970	1981
Algeria	3.5	6.7	.3
Congo	51.0	29.0	7.6
Ecuador	2.4	1.7	2.7
Gabon	10.7	9.0	2.4
Guyana	4.7	3.2	5.9
Indonesia	3.7	1.4	2.4
Iran	4.4	4.0	-
Iraq	.8	.9	-
Liberia	3.1	2.7	1.4
Libya	-	-	.3
Mauritania	-	-	-
Nigeria	2.3	1.2	.7
Saudi Arabia	1.4	.1	.6
Trinidad & Tobago	7.0	13.1	5.0
Venezuela	1.8	1.5	1.7
Zaire	8.1	6.6	-
Zambia	.2	.2	-
Small Countries V1			
Bolivia	-	-	2.7
Chile	4.1	4.4	20.2
Jamaica	30.6	46.22	62.6
Jordan	6.6	16.2	32.8
Madagascar	5.3	7.2	6.3
Malaysia	-	7.4	19.1
Morocco	6.4	9.7	23.5
Peru	.7	1.5	17.0
Sierra Leone	60.2	61.2	-
Tunisia	18.8	19.2	35.9
Zimbabwe	-	29.1	-

Source : World Tables Various Issues

Table 11 b

Share of Agricultural Exports in Total Exports

(% of total Exports)

Large Countries V2	1965	1970	1981
Algeria	39.0	20.5	0.8
Congo	44.6	69.8	6.8
Ecuador	95.8	97.2	41.2
Gabon	37.0	34.7	6.4
Guyana	51.3	43.4	49.2
Indonesia	52.8	54.4	21.1
Iran	8.1	6.2	-
Iraq	4.4	4.2	-
Liberia	24.8	23.7	37.7
Libya	.5	0	0
Mauritania	-	-	-
Nigeria	65.3	51.0	4.1
Saudi Arabia	1.0	.1	.1
Trinidad & Tobago	9.7	9.0	2.1
Venezuela	1.0	1.7	.4
Zaire	20.1	15.2	-
Zambia	3.0	.7	-
Small Countries VI			
Bolivia	3.1	4.4	11.1
Chile	7.0	7.4	21.3
Jamaica	41.4	23.1	.4
Jordan	60.1	59.5	25.5
Madagascar	90.5	83.9	84.2
Malaysia	-	62.6	46.0
Morocco	54.7	57.3	31.3
Peru	53.9	49.8	19.5
Sierra Leone	14.4	17.1	-
Tunisia	50.5	34.6	16.2
Zimbabwe	-	47.3	-

Source : World Tables Various Issues

for Algeria, Congo, Jamaica, Jordan, Nigeria and Gabon. For Indonesia and Ecuador, though the share declined considerably, agricultural exports were still fairly important in 1981. The major oil exporters - Saudi Arabia, Iran, Iraq, Libya had almost negligible agricultural exports throughout the period. Among the smaller mineral countries, the shares of agricultural exports also declined, but with the exception of Jamaica most of them managed to maintain agricultural exports to some degree.

The sharp decline in agricultural exports is clearly the product of many factors. Certainly for the larger mineral sector countries the adverse effect of the real appreciation was probably the dominant factor in Algeria, Nigeria, Congo and Gabon - all of which saw steep declines from relatively important shares in exports to below 10%. However, poor pricing policies and a general neglect of this sector were also important causes. Indonesia, and Ecuador, both of which managed to maintain agricultural exports to some degree had also shown much greater Government investment in this area.

Total manufactured exports were not important for most of the countries, the share being less than 10% of

total exports in 1965. In most countries, the share was seen to either remain stagnant or even decline somewhat in the later period. None of the large mineral countries had manufacturing exports accounting for more than 8%. However, in the category of exports of machinery and equipment, almost all the countries had zero or negligible shares. The other manufactured exports category was somewhat higher for some of the countries particularly non-oil mineral economies all showed higher shares of exports in this category. It is likely for some of the countries(Jamaica, Sierra Leone) that these exports included exports of the processed minerals.

The large mineral sector countries which had shown substantially greater than norm manufacturing sectors (Indonesia, Ecuador, Zambia, and Venezuela) showed manufactured exports stagnating at very low levels throughout the period. This clearly supports the view that much of the industrial development in these countries took place in the import competing sector. It appears that the exportable sector in the small mineral countries was less adversely affected by the Dutch Disease. This is shown by the fact that many of the countries in this group managed to maintain important agricultural exports. Many of these

countries also appeared to have developed manufactured exports to some extent. In the case of large mineral countries the adverse effect of the real appreciation was clearly very strong and was a major factor leading to the stagnation of manufactured exports at low levels.

SECTION VI

Trends in the Real Exchange Rate:

The appreciation of the real exchange rate is the crucial mechanisms via which the resource allocation effects of the spending effect are brought about. The immediate impact of a boom is to result in a real appraciation of the exchange rate. In the medium-run with capital mobility, there will be a reallocation of resources (labour and capital) to the Non-tradeables sector. This will lead to an expansion in the output of the Non-tradeables output and therefore moderate the extent of the real appreciation. As the mineral boom is a real phenomenon, the ultimate effects on the exchange rate are determined by real factors, and the long-run equilibrium level of appreciation is independent of the exchange rate regime followed. However, the mechanism via which the real appreciation is achieved differs for the two exchange rate regime. Under fixed exchange

rates the real appreciation comes about by an increase in the domestic nominal price of non-tradeables. Under flexible exchange rates, there is a nominal appreciation of the exchange rate so that the domestic price of tradeables falls. In both cases, the relative profitability in the Non-tradeable sector increases.

To get a broad idea of the influence of the mining sector on trends in the real exchange rate, a simple regression equation of the real exchange rate on share of mining in GDP was estimated. The results are given below:

RER = 1.0462 - ,26733Vm

(62.52) (-3.529)

R2 = .0211 SEE = .28

Thus it appears that the share of mineral sector in GDP was a significant factor in explaining trends in the RER. The negative coefficient is in line with the predictions of the Dutch Disease theory: a larger mining sector was seen to result in a real appreciation.

We now analyse trends in the RER index for individual countries . The RER index base year of 1972 was useful for the oil exporters as they experienced

large windfall gains in the post 1973 period. For non-oil economies which had been mineral exporters of long standing (Chile, Peru, Bolivia etc.) it is likely that the RER would have adjusted to the mineral sector. Most of the non-oil mineral exporters had fairly high shares of the mineral sector by 1964. This was also true for some of the oil exporters (Venezuela, Saudi Arabia, Iraq)

As expected, the major oil exporting economies showed a fairly significant appreciating trend after 1972. These were Ecuador, Gabon, Indonesia, Iran, Algeria, Saudi Arabia and Trinidad and Tobago. Surprisingly Venezuela showed a relatively stable exchange rate for the period although it was a major oil exporter Algeria also showed a more moderate degree of appreciation. Gelb (1985) attributes this to price controls which may have dampened the extent of the real appreciation (Ref. Table 12).

In the case of other non-oil large mineral sector countries no clear cut trend was discernible. Liberia and Mauritania both showed fluctuations in the exchange rate before 1972, but an appreciating trend after 1972. Guyana showed a tendency for the exchange rate to depreciate throughout the period considered.

Table 12

Trends in the Real Exchange Rate (1972=100)

Large Countries VI2	1964	1969	1972	1975	1977	1979	1981	1983	1985
Algeria	-	111.7	100	106.8	102.0	88.0	97.8	97.5	79.0
Congo	105.8	106.9	100	97.5	101.2	89.2	113.2	134.8	132.2
Ecuador	88.2	79.2	100	91.4	81.1	79.9	75.6	80.7	62.;0
Gabon	99.4	103.0	100	81.7	76.0	66.8	87.0	98.0	97.3
Guyana	80.9	94.0	100	121.6	124.0	110.7	107.0	86.5	80.4
Indonesia	145.2	87.7	100	67.0	56.0	78.0	74.0	90.0	91.5
Iran	97.0	101.0	100	93.4	76.0	74.4	70.0	56.0	-
Iraq	110.0	109.0	100	105.0	95.0	-	-	-	-
Liberia	104.0	94.0	100	90.5	90.0	91.0	91.6	87.0	85.5
Libya	111.5	89.0	100	104.0	103.3	102.5	-	-	-
Mauritania	112.0	115.0	100	93.5	87.0	92.0	90.0	93.7	168.2
Nigeria	141.4	132.0	100	86.5	68.0	57.0	54.0	50.0	40.0
Saudi Arabia	99.0	102.0	100	63.0	48.0	55.0	64.0	69.0	79.0
Trinidad & Tobago	99.0	108.0	100	101.2	100.6	97.0	90.0	72.0	57.0
Venezuela	95.0	100.0	100	115.0	110.4	111.0	98.0	97.0	111.1
Zaire	58.0	118.0	100	77.0	48.0	38.0	63.0	79.0	112.0
Zambia	129.0	102.0	100	104.4	100.0	96.0	102.0	113.0	100.0
Small Countries VI									
Bolivia	83.2	71.0	100	74.0	73.0	82.0	54.0	-	-
Chile	71.1	116.0	100	284.0	231.0	259.0	209.0	312.0	347.0
Jamaica	103.0	111.0	100	95.0	86.0	116.0	102.0	90.0	152.0
Jordan	-	107.0	100	88.5	79.0	66.0	82.0	83.0	85.0
Madagascar	102.0	106.0	100	89.0	105.0	-	93.0	97.0	110.0
Malaysia	97.0	104.0	100	92.0	98.0	98.0	109.0	103.0	107.0
Morocco	101.0	108.0	100	98.0	99.0	88.0	118.0	142.0	156.0
Peru	117.0	107.0	100	97.0	121.0	150.0	125.0	144.0	100.0
Sierra Leone	94.0	103.0	100	114.0	127.0	106.0	103.0	81.0	39.0
Tunisia	99.0	108.0	100	104.0	109.0	111.0	140.0	160.0	162.0
Zimbabwe	103.0	105.0	100	108.0	105.0	110.0	117.0	130.0	141.0

Source : World Tables Various Issues

On the other hand Zambia showed a tendency for the exchange rate to appreciate throughout the period, though after 1972 the extent of appreciation was moderate. In the case of the small mineral sector countries also the picture was mixed. The oil exporting countries showed some amount of appreciation after 1972 for a few years (Jordan, Malaysia). Most of the countries in this group appreared to have fairly stable exchange rates with small fluctuations and some amount of appreciation for a few years.

Thus with regard to the exchange rate the oil exporters clearly had a strong appreciating trend. For non-oil mineral countries the trend was less clear-cut, with either a tendency to appreciate throughout the whole period (Liberia, Mauritania) or even a tendency towards a mild depreciation (Guyana). A few of these countries maintained relatively stable exchange rates in the face of a large mining sector - Venezuela, Zambia and Congo.

By and large, the movements in the real exchange rates reflect the type of resource allocations observed in these countries. Thus the steep appreciation for Nigeria, Gabon, Indonesia and to some extent Algeria & TTO appear to have had very sharply

negative effects on exports particularly agricultural exports, which were fairly important in these economies at the beginning of the period. Only in Ecuador and Indonesia were the agricultural exports not as hardhit, although even in these countries there were substantial declines in the shares. Peter Warr on a study of the Indonesian economy finds that Indonesian agriculture showed the most severe declines in the unprotected non food producing parts of the agriculture sector. In countries like Saudi Arabia, Libya, Iran, Iraq, the exports were already at a negligible level at the beginning of the period.

The small mineral sector countries - Tunisia Malaysia and Morrocco had real exchange rates which were relatively stable throughout the period and the tendency to appreciate was limited to a few years only. The exports of these countries particularly agricultural were less hard hit by the mineral sector.

Thus broadly, the trends in the real exchange rate link up with the type of resource allocation patterns observed in most of the sample countries particularly the behaviour of exports. Structural change in many of the sample countries considered was considerably

affected by the Government's development policies and the foreign trade regime.

CONCLUSION

Thus in conclusion, analysis of the individual country experience suggests that for countries with large mineral sector, structural change was strongly influenced by the existence of a large mineral sector. The most affected countries were the major oil exporters with low populations where the spending effect is likely to be very strong. The Dutch Disease clearly dominated structural change in these economies.

The concentration of a large part of Government investment expenditure in the construction sector is likely to exacerbate the tendency towards a real appreciation. It appears that the adoption of protective strategy towards the import competing sector may alleviate some of the contractionary effects of the Dutch Disease on this sector. Countries showing this pattern were (Indonesia, Ecuador, Jamaica etc.) were

characterised by above norm manufacturing sector. Such a policy is likely to harm the manufacturing export sector even more. This is borne out by the fact that countries which followed this strategy (i.e Indonesia, Ecuador, Venezuela, Zambia) had manufactured exports stagnating at low levels.

The agricultural sector in most of the sample countries represents more truly a tradeable sector, as in most countries it was not protected. This is also borne out by the very sharp deterioration in this sector which appeared to be a common feature in most countries. Some of the larger mineral sectors economies in particular Nigeria, Algeria, Congo and Gabon showed very sharp declines in the share of agricultural exports.

Thus in sum it appears that development policies were able to alleviate some of the negative of the Dutch Disease on manufacturing, whereas, a combination of policy neglect and the real appreciation may have resulted in a substantial worsening of the position of agriculture.

CHAPTER IV

SUMMARY OF MAIN FINDINGS AND CONCLUSIONS

CHAPTER FOUR

SUMMARY OF MAIN FINDINGS AND CONCLUSIONS

The main purpose of this study has been to examine the effect of an important mineral sector on the long-run patterns of structural change in developing economies. The study derives some broad hypotheses regarding the influence of an mineral sector on the basis of the models of the Dutch Disease. Essentially, these models predict a tendency for a movement of resources out of the tradeables to the non-tradeables sector both in the short and long-run. The real appreciation of the exchange rate is the key mechanism for bringing about this switch.

The analysis was cross-sectional, and aimed to establish features of development patterns common to the mineral economy group. The Chenery-Syrquin norm pattern of structural change was used as a bench mark with which to compare the average pattern of change for mineral economies. The sample of mineral economies was also segmented to examine the effect of group specific factors on the patterns of change. Thus the sample was segmented by differences in the size of the mineral sector, the orientation of production of the non-mining

parts of the economy and scale. The analysis in chapter two was aggregative in nature, and was indicative of broad trends in the pattern of structural change attributable to these factors. Chapter three, examined the broad development policies followed by mineral economies and the relevance of policy factors in explaining the deviation of individual country patterns from the predicted share. The study also briefly examines, the actual pattern of resource allocation in countries, the trends in export composition, and the real exchange rate, to determine the countries which appeared to be more seriously affected by the Dutch Disease.

The following are the main findings emerging from the study:

1. The share of industry for mineral economies was found to lag behind, the Chenery - Syrquin pattern. Disaggregation of industry into manufacturing and construction showed, the stagnation in the share of manufacturing to be mainly responsible for the stagnation of industry. The share of manufactured exports also stagnated at very low levels, whereas the Chenery -

Syrquin study predicts a steady increase in it's share over the transition.

2. Although, it was not strictly correct to compare the trends in the share of agriculture with the Chenery - Syrquin study as they consider the primary sector as a whole. Nevertheless, a broad comparsion suggests that the agricultural sector in mineral economies declined very steeply with income over the transitional range and the extent of this decline with income is far greater than is likely for developing economies with the process of growth.

3. The inclusion of the share of mineral sector was highly significant in the equations and led to fairly substantial increases in goodness of fit particularly for the manufacturing sector. The coefficient of Vm was strongly negative for both groups of tradeables. Thus on average the share of the mineral sector exerted a strongly negative effect on both agriculture and industry.

Subdivision of the sample by the size of the mineral sector yielded some interesting tendencies :

4. There was a difference in the effect of the mineral sector between small mineral countries (VI) and large

mineral sector countries (V2), particularly with regard to the manufacturing sector. For the VI group the Vm coefficient was found to exert a positive influence on the manufacturng sector whereas for the V2 group it had the usual negative effect. The Vm coefficient had the expected negative effect on the share of agriculture for both groups. The variation in shares with income showed that tthe shares for both agricultural and manufacturing were much lower for the V2 group at each level income compared to the V1 group. This appears to support the hypothesis that the Dutch Disease was much stronger in the V2 group. In keeping with this tendency, the V2 countries also showedahigher share of construction activity at each income level.

Segmentation of the sample by the production orientation of the non-mineral economies was also highly significant for each of the sectors considered.

6. As expected, the I oriented group of countries showed relatively larger manufacturing sectors than the P group. However, the performance of agriculture for this sector was considerably worse. Nor did the larger manufacturing sector in these countries lead to a better export performance for manufactures.

7. The above findings suggest that many of the I group countries had developed relatively large manufactured sectors by policies of domestic import substitution in highly sheltered markets. This view is reinforced both by the worse performance of the agricultural sector and the stagnation of manufactured exports at low levels.

The final segmentation was by the size of the population. This was essentially to examine possible modifications in the patterns of resource allocation arising from the effect of market size.

8. It was found that the larger size of the domestic market offered greater scope for industrial development in the M group. The manufacturing sector in the S group was found to lag behind. The performance of agriculture was also much worse for the S group. Taken together, these suggests that S countries are likely to have been more open with trade, and therefore the resource allocation processes in these countries are likely to be more vulnerable to the adverse effect of the Dutch Disease arising from the real appreciation. This is also supported by the greater tendency to switch to non-tradeables in these economies reflected in the higher shares of the construction sector.

The above analysis provides some broad indicators of the underlying trends and factors which may have influenced resource allocation and structural change in these economies. Essentially, this analysis has established certain broad stylised facts regarding the process of structural change for mineral economies. Although as Chenery and Syrquin note that such analysis can not be used to validate theories, the statistical results are likely to be more consistent with one formulation than another. Thus, our results suggest that on average the stylised facts obtained are broadly in keeping with the type of pattern of resource allocation predicted by the Dutch Disease models in the long run. This is reinforced by the negative sign of the coefficient for Vm for the two tradeable sectors, and the positive coefficient for the construction sector which is a non-tradeable. Interestingly differences in the size of the mineral sector had differing effects on resource allocation of the manufacturing sector. For countries with smaller mineral sectors, the existence of the mineral sector exerted a positive influence on the share of manufacturing in GDP. This may be either due to the fact that the effects of the Dutch Disease were much milder for this group of countries and the positive

effect of increased revenues due to the mineral sector may have dominated. For the larger mineral sector countries, the negative effects of the Dutch Disease on manufacturing were clearly dominant.

The second part of the study examines the development policies followed by the mineral economies. These have implications both for the macro-economic effects of the Dutch Disease, and the future growth prospects of the economy. A major objective of these countries was to try and utilise mineral revenues to achieve rapid development and growth.

Presented below are the main features of the development policy responses followed by mineral economies.

1. The evidence suggests that the Government is likely to be the major recipient of mineral rents in developing economies. Thus the expenditure decisions of the Government are likely to be an important determinant of the spending effect.

2. Most mineral economies showed higher levels of Government consumption then was the average for developing countries. Comparison with Chenery and

Syrquin norm shares showed that for these economies the increase in Government consumption was particularly marked at the lower income levels. The mineral economies also showed higher rates of GDI. Again this was more marked at lower income levels compared to the norm. This suggests that to some extent that the existence of a mineral sector relaxed fiscal and foreign exchange constraints, particularly for the lower income countries and enabled them to embark on more ambitious development programmes.

3. Most of the increased Government expenditures in these economies was directed towards the development of the infrastructure sector particularly transport and communications and public utilities. These are all in the non-tradeable sector, and in the short - run a large proportion of the increased expenditure would tend impinge on the construction sector. This has important implications for the Dutch Disease as it implies that in the short-run there is a sizable increase in demand for non-tradeables particularly services and construction. With regard to the allocation between industry and agriculture, most of the countries appeared to be spending more on the agricultural sector. Thus in most countries the

Government investment was mainly concentrated in the infrastructure sector.

4. On average mineral economies had higher shares of imports in GDP compared to developing economies as a group. Many of the countries particularly the oil exporters appeared to have liberalised imports considerably.

5. Most of the countries in the sample still maintained highly protectionist policies towards domestic industry. This was particularly important for Indonesia, Iran, Jamaica, Nigeria, Tunisia, Peru. Although many of the other also had such barriers to a varying degree.

The study then examines the deviations of individual country patterns from the predicted share for mineral economies. The analysis is done at two levels : firstly the deviations were regressed on both policy and other variables likely to result in substantial deviations. Secondly, the pattern of individual country deviations was analysed in terms of the resource endowments and development policies of the country. Further confirmation of the patterns of resource allocation was provided by looking at trends in export composition and the real exchange rate.

6. Separate equations were also estimated for the deviations of the manufacturing and construction sectors with the same independent variables. This showed some interesting differences on the effect of development policies on these sectors.The rate of GDI was highly significant for the construction sector and was associated with a tendency for overprediction of this sector, whereas it did not influence deviations for the manufacturing sector significantly.On the other hand, the real exchange rate was highly significant in influencing deviations for manufacturing. The equations for the agricultural sector showed that development policy variables were relatively unimportant factor in influencing deviations for this sector.

The above findings support the earlier view that the bulk of increased investment impinged on the construction sector and that direct Government investment in the manufacturing sector was relatively unimportant.

Finally the study also looks at the pattern of individual country's deviations from the predicted shares and the trend.

7. Overall, most of the large mineral sector countries, showed severe shortfalls from the predicted

shares. This was most marked for the major oil exporters. Countries in this Group with important agricultural exports saw a rapid decline in share (Algeria, Congo, Gabon, Nigeria). No country with a large mineral sector showed a tendency to develop manufactured exports. This was so even for countries showing substantial over prediction of this sector (Indonesia, Venezuela, Zambia, and Ecuador). These countries clearly followed policies of domestic import substitution with heavy protection to the import competing sectors.

The export performance of the smaller mineral sector countries was much less adverse.

9. With regard to trends in the real exchange rate, only the oil exporters showed a clearcut pattern of appreciation after 1972. For the non-oil exporters the trend was less clear cut.

In conclusion, this study essentially establishes certain stylised facts regarding the process of structural change in mineral economies. These were by and large found to be consistent with the predictions of the Dutch Disease models. The aggregative analysis is also supported by the pattern of behaviour of

individual countries with respect to resouce allocation, export performance and trends in the real exchange rate. Ofcourse as Chenery and Syrquin note the above results cannot be taken to validate the Dutch Disease. Nevertheless, the results, and the broad patterns of structural change as well as the behaviour of other economic indices can be taken to provide some support for the manifestation of the Dutch Disese in these countries.

SELECT BIBLIOGRAPHY

SELECTED BIBLIOGRAPHY

BOOKS

Balassa, B., "The Structure of Protection in Developing Countries" (Baltimore Md : Johns Hopkins University Press, 1971)

Balassa, B. and Associates," Development Strategies in Semi-Industrial Economics", (Johns Hopkins University Press, 1982)

Baldwin, R.E., " Economic Development and Export Growth : A Study of Northern Rhodesia, 1920-1960". (Berkely : University of California Press, 1966)

Buiter, W.. and Purvis, D.D. , " Oil, Disinflation and Export Competitiveness : A Model of the Dutch Disease", in Bhandari, J. and Putnam, B (eds), "Economic Interdependence and Flexible Exchange Rates" (Cambridge, Mass - MIT Press, 1982).

Bruno, M. and Sachs, J. "Economics of Worldwide Stagflation" (Oxford : Basil Blackwell, 1985)

Caves, R.E."Vent for surplus Models of Trade and Growth" In Baldwin, R.E. and others, (eds) "Trade Growth and the Balance of Payments" (Chicago : Rand McNally, 1965)

Chenery, H.B., "Structural Change and Development Policy"(New York : Oxford University Press, 1979)

Chenery, H.B. and Syrquin, M., "Patterns of Development, 1950-70" (London Oxford University Press, 1975)

_____, "A Comparitive Analysis of Industrial Growth and Resources", in Mathews, R.C.O (eds) "Economic Growth and Resources" Vol.2, Trends and Factors (New York : Macmillan, 1980)

Chenery, H.B., Robinson, S., and Syrquin, M., "Industrialization and Growth : A Comparative Study" (Oxford University Press, 1981)

_____, "Trade Policy and Economic Welfare"(Oxford Clarendon Press, 1974)

Corden, W.H., "Exchange Rate Protection" in Cooper, R.N. et al (eds) "The International Monetery System under Flexible Exchange Rates" (Cambridge Mass : Balinger Publishing Company, 1981)

Corden, W.H., and Oppenheimer, P., "Economic Issues for the Oil-Importing Countries" in Rybczynski, T.H. (ed)"The Economics of the Oil Crisis" (London : Macmillan, 1976)

Dornbusch, R., Leslies, F.C. and Helmers, C.H. (ed) "The Open Economy : Tools for Policy makers in Developing Countries" (Oxford University Press, 1988)

Johnson, H. G., "The Transfer Problems and Exchange Stability", in Johnson, H.G., "International Trade and Economic Growth : Studies in Pure Theory (London : George Allen and Unwin, 1958)

Krueger, A.O. "Liberalization Attempts and Consequences" (Cambridge, Mass : Balinger Publishing Company, 1978)

Kuznets, S., "Modern Economic Growth" (New Haven, Conn : Yale University Press, 1966)

Lewis, S.,"Development Problems of the Mineral-Rich Countries" in Syrquin, M., Taylor, L., Westphal, L.E., "Economic Structure and Performance : Essays in Honour of Hollis, B. Chenery" (Academic Press INC, 1984)

Malinvaud, E., "The Theory of Unemployment Reconsidered" (Oxford : Basil Blackwell, 1977)

Neary, J.P. "Real and Monetary Aspects of the Dutch Disease" in Jungenfield, K. and Hague, D., (eds) "Structural Adjustment in Developed Open Economies (London : Macmillan, 1985)

Neary, J.P. and Van Wijnbergen, S. (eds)"Natural Resources and the Macro-Economy"(Basil Blackwell, 1985)

Taylor, L., "Structuralist Macro-Economics" (New York Basic Books, 1983)

ARTICLES IN PERIODICALS

Baldwin, R.E. "Export Technology and Development From a Subsistence Level", Economic Journal, Vol.73 (March, 1963) pp.80-92.

Bruno, M., "Adjustment and Structural Change under supply shocks", Scandinavian Journal of Economics, Vol. 84, 1982, pp.199-221.

Bruno, M. and Sachs, J. "Energy and Resource Allocation : A Dynamic Model of the Dutch Disease" Review of Economic Studies, Vol.49(5), 1982, pp.845-859.

Chenery, H.B. and Taylor, L. "Development Patterns : Among Countries and overtime", Review of Economics and Statistics, Vol50,November 1968, pp.391-416.

Corden, W.H.,"Trade, The Exchange Rate, Monetary Policy and North Sea Oil : The Economic Theory of the Squeeze on Tradeables", Oxford Economic Papers, 33 (July 1981a) pp.23-46.

_____, "Exchange Rate Policy and the Resources Boom", Economic Record Vol 58 (March 1982), pp 18-31.

_____, "Booming Sector and Dutch Disease Economics : Survey and Consolidation", Oxford Economic Papers Vol 36, 1984, pp359-360.

Corden, W.H. and Neary, J.P. "Booming Sector and De-Industrialisationin a small open Economy", Economic Journal Vol 92 (December 1982) pp 825-848.

Dasgupta, P., Eastwood, R. and Heal,G. "Resource Management in a Trading Economy", Quarterly Journal of Economics Vol 92 (May 1978) pp 197-206.

Eastwood, R.K. and Venables, A.J. "The Macro-economic Implications of a Resource Discovery in an Open Economy", Economic Journal Vol 92 (June 1982), pp 285-299.

Enders, K. and Herberg, H. "The Dutch Disease Causes, Consequences, Cures and Calmatives", Welwirtschaftliches Archiv Vol 119,3, 1983, pp.473-497.

Findlay, C.C. and Jones, R. "Marginal Cost of Australian Income Taxation ", Economic Record Vol 88, 1982, pp.253-262.

Flemming, J.S. "U.K. Macro-Policy Response to Oil Price Shocks of 1974-75 and 1979-80", European Economic Review 18, 1982, pp.223-234.

Forsyth, P.J. and Kay, J.A. "The Economic Implication of North Sea Oil Revenues", Fiscal Studies 1 (July 1980), pp.1-28.

Forsyth, P.J. and Kay, J.A., "Oil Revenues and Manufacturing output", Fiscal Studies 2, 1981, pp.9-17.

Forsyth, P.J. and Nicholas, S.J. "The Decline of Spanish Industry and the Price Revolution : A Neoclassical Analysis", Journal of European Economic History, 12, 1983, (Winter), pp.601-609.

Gregory, R.G. "Some Implications of the Growth of the Mineral Sector", Australian Journal of Agricultural Economics, 20, (August, 1976), pp.71-91.

Harberger, A.C. "Dutch Disease : How much sickness, How much Boon?" Resources and Energy, 5, 1983, pp.1-22.

Hoel, M., "Employment Effects of an Increased Oil Price in an Economy with Short-Run Labour Immobility", The Scandinavian Journal of Economics, Vol 83, 1981, pp.269-276.

Kemp, M.C. and Long N.V. "International Trade with an Exhaustible Resource : A Theorem of Rybczynski Type". International Economic Review Vol. 20 October 1979, pp. 671-677.

Long, N.V. "On the Effects of a Booming Export Industry on the Rest of the Economy", Economic Record 59, March 1983, pp. 57-60.

Maddock, R. and McLean, I. "Supply side Shocks : The Case of Australian Gold", Forthcoming in Journal of Economic History in 1983.

Martin, J.P. and Neary, J.P. "Variable Labour Supply and the Pure Theory of International Trade : an empirical note. Journal of International Economic, Vol. 10, November, pp. 549-559.

Mussa, M. "The Two sector model in terms of its dual : a geometric exposition, Journal of International Economics, Vol. 9, November 1979, pp. 513-526.

Neary, J.P. "Short-run Capital Specificity and the Pure Theory of International Trade". Economic Journal, Vol. 88, 1978, pp. 488-510.

Neary, J.P., "Nontraded Goods and the Balance of Trade in a Neo-Keynesian Temporary Equilibrium," Quarterly Journal of Economics, Vol. XCV, November 1980, pp. 403-429.

Neary, J.P. and Purvis, D.D., "Sectoral Shocks in a Dependent Economy : Long-run Adjustment and Short-run Accommodation". The Scandinavian Journal of Economics, Vol. 84, 1982, pp. 229-253.

Neary, J.P. and Wijnbergen, S.V., "Can an Oil Discovery lead to a Recession : A comment on Eastwood and Venables'. Economic Journal,94, 1984, pp. 390-395.

Pinto, B. "Nigeria During and After the Oil Boom : A Policy Comparison with Indonesia", The World Bank Economic Review, Vol. I, No. 3, 1987 pp. 411-445.

Porter, M. G., "External Shocks and Stabilization Policy in a Small open economy", 1978.