A Theoretical & Applied Research in the Field of Degree of Dependency of Economic Growth of Developing Countries to the Economic Growth of Developed Countries

By:
Alireza Rahimi Boroujerdi[*]

Abstract

The analyses by the first ranked economists show that the economical growth of the countries that import oil or non-oil developing countries (NODCs) depends on the economical growth of the industrial countries. "Goldstein" & "Khan" by means of a long & complete verification show the dependence of the economical growth and "Callier" also claims this fact that the economical growth of the countries that import oil relates on the industrial countries and also depends on the real interest rate.

The author of this paper generalizes the above idea in these facts that:

This verification also includes the countries that export oil or oil-exporting developing countries (OXDCs) and by the way among all the countries that are talked about, the Islamic republic of Iran is chosen and the influence of these parameters on the economical growth of this country is analyzed.

In contrast with "callier's" conclusions first of all this paper shows that nominal interest rate has influenced by the growth of the NODCs countries considerably. Secondly the economical growth of the industrial countries and world interest rate do not have any influence on the economical growth of the countries that are try to improve their oil export.

Additionally this analyze mentions that the economical growth of Iran before & after of Islamic revolution has not influenced by the economical growth of the industrial countries nor the world interest rate and the negative and also the meaningful dummy parameter tell that the economical structure after revolution is not good and if there isn't any plan to change the structure & conditions of the economy the real economical growth encounters the reduction rate of 5%.

---

* - Associate Professor, Faculty of Economics ,Tehran University.

1- Introduction

In the end of the complete verification of the two international monetary fund's economist in 1982 ,Goldstein & Khan thought about the influence of the factors on the growth of the NODCs and by a linear regression they showed that the growth of these countries depended on the industrial countries. Callier improves their sample regression solution and add the interest rate parameter to that and try to find out and conclude that which of the two interest rate (real or nominal) is the related and essential parameter in the economical growth model of these countries. The results of his work show that the economical growth of the countries which import oil (NODCs) depends on the growth of the industrial countries & real interest rate.

This paper generalizes the callier's analyses from the NODCs to the countries which try to improve their power of oil exporting (OXDC's) (among them with special analyses for Iran) and also to all the developing countries (all LDCs). We can introduce the idea of this paper by this way that:

For a long period relation between the economical growths of the semi improved countries & the industrial ones is the center of interest for the economists in 1980. Artour Lewis told that "during the hundreds of years, the growth rate of production in developing countries depends on the growth rate of developed ones". When developed countries grow at fast range the same things are happened to the developing countries & vice versa. Is this relation unavoidable?[1]

Analyses in some extend show that economical growth of the countries that import oil (NODCs) or in general, the economical growth of the developing countries depends extremely on the economical growth of the industrial countries, but there is not enough experimental studies on this matter, especially by looking to the developing countries which export oil, we can see that there isn't any reliable works on data. So, first of all, it is important to do some reliable experimental studies on the theory of dependency and it should be found out that if these countries be governed by the dependency theory or not? Also it is known that these countries try on their economical structure for the past years which indicates of insufficiently of their oiling budget for their investments. So because of their special & equal properties of these countries that they depend greatly on their oil exporting budget, the foreign investments for them is

---

1- Lewis,1980, P.555.

necessary and we should concern the world interest rate on this matter. Because of these points that are mentioned it is important to do such verification and especially studying the economical structure of Iran can do a great deal on the decisions of the economical politicians.

2- The Transfer of Economical Effect of Developed Countries to Developing Countries

A- The Relation between Export Growths of Developing Countries with Real Income Growth of Industrial Countries

A lot of scientists study the affects of the economical performance of the industrial countries on the economical growth of the developing countries, among them Goldstein and Khan did a complete studies on this subject. According to this study the decrease of real income rate of growth in industrial countries lead to a decrease of the volume of their imports. Since the exports of developing nations are mainly consist of basic products and the industrial countries are the main ones who import this materials, any reduction in real income of industrial countries can cause the reduction of the basic products price which leads to disadvantage of the developing countries in this exchange relation. In 1982 Goldstein and Khan by a complete study, analyze the slow rate of influence of the economical growth of industrial countries on the NODCs countries economical growth. Some of their achievements are listed below[1]:

There is a significant difference between that if we say economical growth rate of the industrial countries have a great and positive influence on the NODCs countries growth rate or saying that the first one is mainly determining the growth rate of second one. The first theory is correct but the second is not. There are evidence show that the slowly growing of the industrial countries accompanying with the slow growing of the developing one's. (NODCs).Especially by influence of growing of the real income in industrial countries on growth of the export of developing countries (NODCs). In this regard Goldstein & Khan performed a test on the dependence of the growth of developing countries on industrial ones. Results lead to that among the developing countries, the economical growth rate of developing countries (NODCs) between 1973 to 1980 and the main exporter of the manufacturing

---

1-Goldstein, M, and Khan Mohsen, 1982.

products and the other importer of oil in 1965 to1980, show a meaningful relation on the industrial countries growth rate[1].

B- The Effect of Macro Economical Variables of Industrial Countries on Economic Growth of Developing Countries

The test also shows that the growth rate of developing countries "the pure exporter of the oil" and "countries with low income" during the experiment period do not has a meaningful relation with economical growth rate of industrial countries.

Other test which was done by "Goldsbrough" & "Zaidi" in 1986 in international monetary fund showed that[2]:

Generally macro economics variables in industrial countries, especially the economical growth rate, have great influence on the economical growth of the developing countries, but we should take into consideration that this is not the only factor that governs this fact. Economical structure of them and their policies, always could be assumed as the most important factors of economical performance for the developing countries; also the degree of their absorption in world economy and their dependence on product & financial markets can especially affect the economical influences of the industrial countries on the Developing ones.

Even though the importance of the industrial countries in world product markets decreased relatively during last two centuries, but today these countries are assumed as the first market for the export & the supplier of import products for developing countries. Industrial countries are the most important competitor for the developing ones in the basic products market & manufactories products which have great importance for developing countries. According to Goldsbrough & zaidi it can be concluded that the basic products price in developing countries NODCs in foreign trading is influenced more seriously by the range of economical activity of the industrial countries than the price of manufacture products (the real price of products.) These two showed that a one percent increase in economical growth rate of industrial countries lead to two percent increase in real price of products in short term, but its effect might be less serious in long term. Also there are facts that show the increase in interest

---

1- Callier, 1984, P.468.
2 - Goldsbrough, D. and Zaidi, I. 1986.

rate in industrial countries may pose adverse pressure on real price of products but the most available clue shows that, variation in U.S. exchange rate versus industrial countries currencies do not have any important impact on real price of the products. On the other hand the variation in U.S. exchange rate can affect the relative price of basic products and also manufacture products.

It should be mentioned that, kind, variety & combination of export products in developing countries are the keys of influence by the industrial countries on amount and price of exports by developing countries. History shows that the amount of oil exporter countries among developing countries show great sensitivity on variations in real gross national products of industrial countries. (With estimated elasticity approximately four). A great amount of this sensitivity depend on OPEC oil producer which is about to stabilize the oil price by variation in production but it should be noted that this variation is in accordance to demand variation changing in this strategy lead to reduce sensitivity in export volume of these countries due to gross national products of industrial countries. For countries which do not export oil, the variation in amount of export with elasticity in range of 1.75 to 2.25 in accordance to gross national rate of industrial countries. In the above group the volume of exports for manufacture products of exporter countries shows greater sensitivity in variation of production in industrial countries than the volume of exports for basic products of exporter countries. The relation of trading for countries who do not export oil improve by increase in economical growth rate of industrial countries, but evidence indicates that the affect of economical growth of industrial countries on trading in relation with volume has a lower degree of reliability. There are other alternative approximations which show that short time elasticity of variation in trading rate on the terms of variation in gross national products of industrial countries is at least 0.25 but it can also reach 1.5. Long term elasticity have less values, the reactions of supply have great importance while stock pile of products in variation of demand is not an important factor. Among the group of non oil exporter trading relationship for first products exporter in relation with manufacture products exporter shows greater sensitivity in variation of economical acts in industrial countries. Also the geographical destination of exporter in developing countries is an important factor for economical influences, especially when growing of structure is in misbalanced in industrial countries. Increase of demands in such a sharp & accidental way in the United states of America for imports during 1983-1984 have a greater influenced on the

exported income of Western Hemisphere (Latin America) & Asia than on European & African which depend more significantly on Europe an industrial countries market. Also the protective policies in industrial countries can significantly affect the price & volume of exports in developing countries by reducing the effective demand for their exports. Also the indirect adverse influences on developing countries such as lost opportunities for utilization of economy of scale and the lack of motivation for investment in export could be categorized as important factors. The income of developing countries from private transportation & services is an important source of foreign exchange's income of these countries that among countries with non oil exporter. This is about 30% of total of their export income. These incomes are influenced significantly by macro variables of industrial countries. The econometrics approximation show a one percent increase in real gross national products of industrial countries leads to increase of about 1.25 percent in purchasing power of the exports of non oil exporter countries & about 2.25 increase in purchasing power of receipt of private transfers of these countries. Variation in export incomes of developing countries which be happened due to variation in industrial countries also influence the production rate of these countries. It means that the above export incomes may lead to increase of total demand & also increase in amount of usage of capacity and both of them could be counted by influence of variation in external current account happened by internal financial policies. And in countries with shortage of external exchange, presentation of more external exchange for buying imports data could increase production in significant amount. Approximations although are very difficult to achieve, show that in these countries one percent increase in import can help production to increase about 2 percent. In long term, the higher export rate can lead to higher production rate and both of them could be achieved by influenced on investment rate, improved trading relation, more imports and also by the economical and technological factors which cause a positive relation between export and production growth.

C. The Importance of Financial Markets in Transfer of Economical Effects from Industrial Countries to Developing Countries

Another fact that is worth of mentioning is that during past years, the importance of financial markets in governing the economical influence of industrial countries on developing countries increase significantly, and this is

because of increase in amount of foreign debt of developing countries and importance of foreign supply of credits especially international trading banks. The price of borrowing in developing countries in world investment markets is determined by the financial policies of industrial countries. By the way that a great portion of movement of investment in developing countries is completed by borrowing from banks by different variable rate, the influences of money & financial policies in industrial countries by the means of variations in interest rate can be found in developing countries very fast. By this way, for developing countries who import Capital, econometrics approximations show that a one percent increase in interest rate in financial world markets based on exports and foreign debts in 1985 in short term, causes a one percent increase in paying debts. When the time for paying debts with constant interest rate arrives, because of not paying them, new debts with other interest rate are set, and in long term this makes more influences and because $\frac{4}{5}$ of foreign debts of developing countries whom import Capital are in the form of dollar, the increase in dollar makes their foreign debts less valuable in accordance to their exports income[1].

D. The Role of Prices in Transfer of Economical Effects from Industrial Countries on Developing Countries

Another factor which transfers the economical influences of industrial countries on developing ones is the variation and movement of prices in developing countries and in world markets. A lot of investigators are interested in the prices of basic non oil products and industrial manufacture products and because developing countries are the main importer of this products, the price variations of these products, can influence the economical revenue of developing countries. On the other hand, the price of these products shows great sensitiveness on the economical growth of industrial countries.

From all of the factors that influence the basic non oil products on the demand side can mention the level of economical activities, interest rate, inflation rate in industrial countries, on the supply side, the different variations in industrial countries economy which influence the internal products especially agricultural products could be mentioned. Conclusions show that when supply

---

1- Goldsbrough, D. and Zaidi, I., July 1986.

occasions are relatively constant, the reduction in level of economical activities in industrial countries on primary non oil products shows reducing affect[1].

Sensitivity of prices frequency in developing countries due to economical growth in industrial countries could be shown by diagram no 1. Diagram shows variations of export price of products indicator and primary non oil materials of developing countries in relation to variation of export products price of developed countries (or the import products price of developing countries). The reduction of that indicator in 1980-1992 was about 50 percent of damage to developing countries, although trading relation for developed countries improves in relating to developing countries[2].

It is clear that the price indicator of primary none oil products for developing countries in terms of absolute or relative values, show significant sensitivity to economical activities in industrial countries of OECD, and the sensitivity is frequented by the economical cycles in these countries.

In fact the above prices indicator is the trade relation of developing countries that its variations with economical growth rate of OECD's countries in most years are the same. So the diagram no.1. shows that the improvement of economical growth rate in industrial countries lead to improvement of trade relation of developing countries and the slowness of economical activities in those countries cause to destruction of trade relation of developed countries.

1- Ibid.
2- Trade and Developing Report, 1993, P. 20.

Diagram 1: The variations of export products price indicator and basic materials for developing countries in relation to developed ones
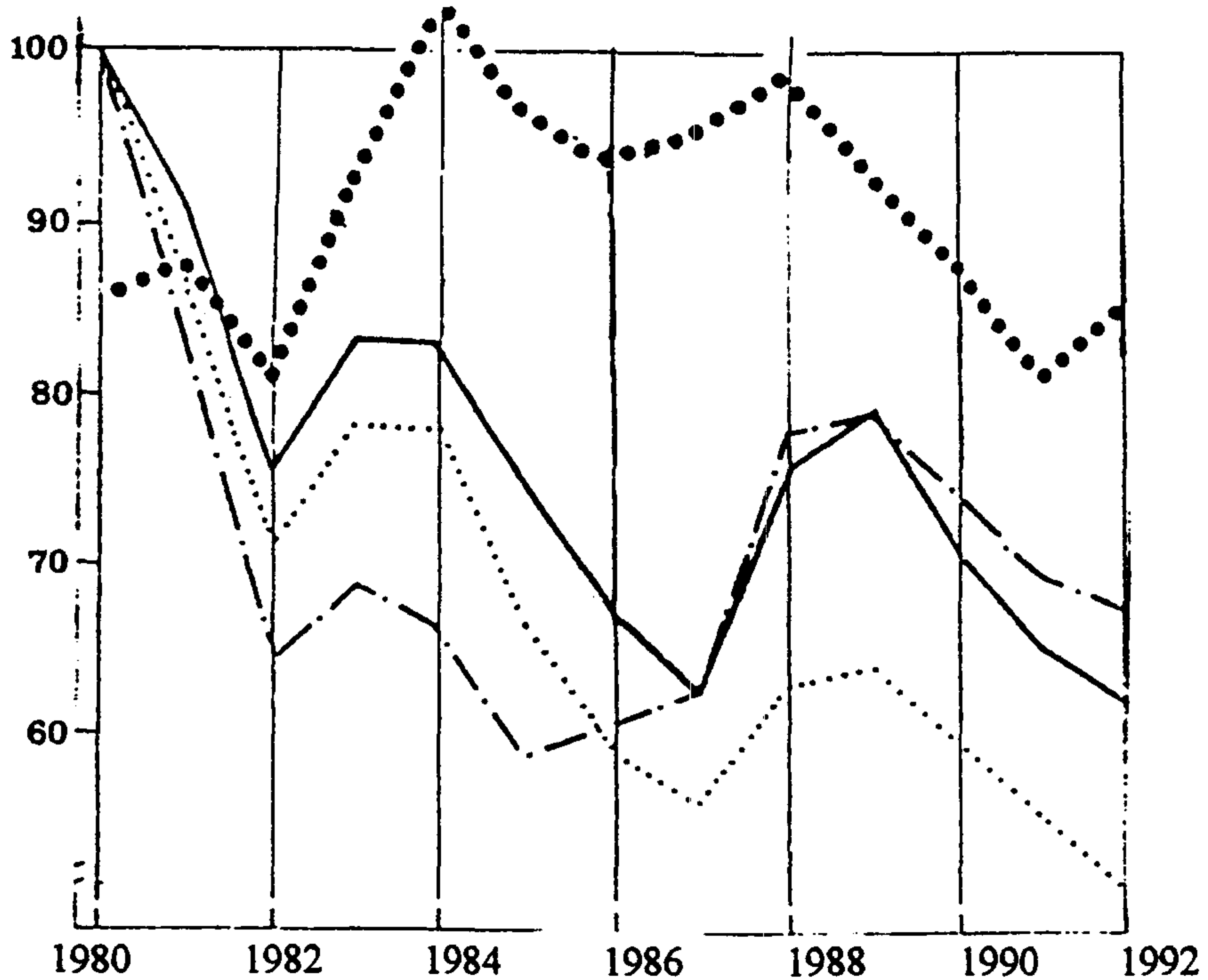
Price Index in Terms of SDX ——
Price Index in Terms of US$ ● - ● - ●-
Relative Price index ················
The Economical Growth Rate of OCED countries ● ● ● ● ●
Reference: "Trade and Development Report, 1993".
United Nations, New York, 1193, p.23

E. The Relation between Export Volume & Terms of Trade of Developing Countries with Economical Growth of Industrial Countries

In addition to effect of movement & variations of prices on economical growth of developing countries, the relation between export volume of

developing countries and the relation between terms of trade of these countries and economical growth of industrial countries are studied in experimental method by researchers to show the effect of economical growth of industrial countries on non industrial ones. Terms of trade of countries which generally export basic products get more advantage from fast growing of industrial countries than the exporter of manufacture products[1]. Also the decrease of economical growth of industrial countries can make no satisfactory affects on the first group. Generally different studying about relation between economical growth of developing countries and economical growth of industrial countries are done. This studying show that from one side the attachment of economical growth of these two groups is made by the volume of exports & terms of trade and from other side, word interest rate is known as an effective factor for dependence of growth of developing countries to economical growth of industrial countries. The dependence of economical growth rate of developing countries on economical growth of industrial countries by the macro variables could be shown by theoretical studies and also by real observations & applied analyses. And what should be taken into consideration is that the results are not the same for all countries and when we analyze country by country the results differ tangibly. Also the analysis of the year's of study, effect significantly on results, so, the case studying and results of researchers are not the same.

3- Model

The model is consisted of a "comprehensive contract" on the term of "functional" relation" between economical growth of developing countries (Y= domestic gross product) and four variables:

Growth of industrial countries (GIC= domestic gross products of industrial countries)

Nominal interest rate (NIR)

Real interest rate (RIR) if RIR= NIR-PX when PX is price (unit value) of export for America

Labor force (L)

Compose of constant physical investment (K)

1- The previous diagram compares the basic products and the manufacture products and shows the sensitivity of each of them due to economical growth of industrial countries.

Ram[1] & other use population growth rate for their evaluation of rate of growth of working force and in these analyses like the pre ones the population growth rate is an indicator of working force growing rate. Also, the rate of London Eurodollar[2] is used for NIR.

For comparison, three groups of developing countries are taken into consideration:

Countries which do not have oil supply & import oil (NODCs)

The exporter of oil (NODCs) like Iran.

All the developing countries (All LDCs) for all of three group the model is made:

$$Y1 = f(GIC, NIR, RIR, L, K) \tag{1}$$
$$Y2 = f(GIC, NIR, L, K) \tag{2}$$
$$Y3 = f(GIC, RIR, L, K) \tag{3}$$

In equation 1 both nominal interest rate and real interest rate are used[3], although equations 2 and 3 use these two separately.

If we do total differentiation of 1, 2, 3

$$dy1 = (\partial y1/\partial GIC)*dGIC + (\partial y1/\partial NIR)*dNIR + (\partial y1/\partial RIR)*dRIR + (\partial y1/\partial L1)*dL + (\partial y1/\partial K)*dk \tag{4}$$

$$dy2 = (\partial y2/\partial GIC)*dGIC + (\partial y2/\partial NIR)*dNIR + (\partial y2/\partial RIR)*dRIR + (\partial y2/\partial L)*dL + (\partial y2/\partial K)*dk \tag{5}$$

$$dy3 = (\partial y3/\partial GIC1)*dGIC + (\partial y3/\partial RIR)*dRIR + (\partial y3/\partial L)*dL + (\partial y3/\partial K)*dk \tag{6}$$

If we divide 4, 5, 6 by Y and some mathematics we see

1- Ram Rati, 1987.
2- Eurodollar-London Rate (IFS, IMF, line 60d).
3- It shows that, using both nominal and real interest rate caused the model to be in problem of multicolinearity. But because the changing that be done to each variable and the results of test evaluation such as correlation coefficient, there is not any high level multicolinearity in model.

$$dY1/Y1 = (\partial Y1/\partial GIC)(dGIC/GIC)(GIC/Y1)$$
$$+ (\partial Y1/\partial RIR)(dRIR/RIR)(RIR/Y1) + (\partial Y1/\partial L)(dL/L)(L/Y1)$$
$$+(\partial Y1/\partial K)(dK/K)(k/Y1) \tag{7}$$

$$dY2/Y2 = (\partial Y2/\partial GIC)(dGIC/GIC)(GIC/Y2)$$
$$+ (\partial Y2/\partial NIR)(dNIR/NIR)(NIR/Y2)$$
$$+ (\partial Y2/\partial RIR)(dRIR/RIR)(RIR/Y2) + (\partial Y2/\partial L)(dL/L)(L/Y2)$$
$$+(\partial Y2/\partial K)(dK/K)(k/Y2) \tag{8}$$

$$dY3/Y3 = (\partial Y3/\partial GIC)(dGIC/GIC)(GIC/Y3)$$
$$+ (\partial Y3/\partial NIR)(dNIR/NIR)(NIR/Y3)$$
$$+ (\partial Y3/\partial RIR)(dRIR/RIR)(RIR/Y3) + (\partial Y3/\partial L)(dL/L)(L/Y3)$$
$$+(\partial Y3/\partial K)(dK/K)(k/Y3) \tag{9}$$

We can find production elasticity from right side of 7, 8, 9 and the equations no. 10, 11, 12 that are on terms of growth rate is made as:

$$g1 = (\mu i)gi + (\mu n)n + (\mu r)r + (\mu L)l + (\mu k)k \tag{10}$$
$$g2 = (\beta i)gi + (\beta n)n + (\beta L)l + (\beta k)k \tag{11}$$
$$g3 = (\alpha i)gi + (\alpha r)r + (\alpha L)l + (\alpha k)k \tag{12}$$

$gn = dYn/Yn$ n=1,2,3	Growth rate of domestic gross products
$gi = dGIC/GIC$	Growth rate of domestics gross products of industrial countries
$n = dNIR/NIR$	Nominal interest growth rate
$r = dRIR/RIR$	Real interest growth rate
$l = dL/L$	Labor force growth rate
$k = dK/K$	Investment growth rate
μi , βi , $\alpha i = (\partial Y/\partial GIC)(GIC/Y)$	Elasticity of products in relation to domestic gross products of industrial countries

μn, βn, αn = $(\partial Y/\partial NIR)(NIR/Y)$ Elasticity of products in relation to nominal interest rate

μr, βr, αr = $(\partial Y/\partial RIR)(RIR/Y)$ Elasticity of products in relation to real interest rate

μL , βL,αL = $(\partial Y/\partial L)(L/Y)$ Elasticity of products in relation to Labor force

μk , βk ,αk = $(\partial Y/\partial K)(K/Y)$ Elasticity of products in relation to investments

By adding constant terms and random variables to equations 10, 11, 12 can reach special econometrics equations that use for estimation:

$$g1 = \mu0 + (\mu i)gi + (\mu n)n + (\mu r)r + (\mu L)l + (\mu k)k + U \qquad (13)$$
$$g2 = \beta0 + (\beta i)gi + (\beta n)n + (\beta L)l + (\beta k)k + V \qquad (14)$$
$$g3 = \alpha0 + (\alpha i)gi + (\alpha r)r + (\alpha L)l + (\alpha k)k + \omega \qquad (15)$$

In experimental studies the equations 13, 14, 15 are estimated for NODCs, OXDCs and ALL LDCs and Iran.

4- Data & Estimating Method

Usage data for production, population and prices for all the studied group is found from IFS which is printed annually by the international monetary fund[1] and the investment data is gained from other IMF[2] magazines.

The period of studding is from 1965 to 1985 as Goldstein and Khan have chosen, and the data are saved annually. Although the period of data is about 60 to 80 and it seems to be old, but this period is only a proxy of our studying that shows the dependency of the developing countries to developed ones, so the selection of a period is not important. The investment data for 1983-1985 do not existed which reduces the degree of freedom. For the estimation of studying model the OLS method is used. Because the data are in form of time series, we

1- International Financial statistics (IFS), Year Book, 1986-88.
2- IFS, Supplement on Output Statistics, 1984 -85.

expect that the error terms in time series data to be autoregressive and in this step, the GLS method on the postulate of a first order autoregressive stochastic term has been employed to estimate the model.

5- Results

The solved model in "Callier" paper does not consider the important reliable variables. Dropping out these variables may cause errors on estimation of the model and causes the result, to be inefficient. Any way the growth model that be used in this analyze included some important variables such as working force and investment that their existence in growth model are necessary.

The samples for all three groups are about 19 and for Iran is 21 that seems to be enough for our statistical test. The variation in economical growth for all three groups is well illustrated by regression line. The R^2 in oil importer countries NODCs and ALL LDCs are about 84%, besides oil exporters OXDCs which is about 48%. In addition the results for Iran are shown separately.

Table n.1. shows the result of growth model which nominal interest rate is used in that (equ. 14). Table 2. Included real interest rate. (equ. 15). The result of growing model includes nominal interest rate and real interest rate. (equ. 13) are gathered in table 3. Table 1 and 2. mean that growth of oil importers NODCs and ALL LDCs is affected positively by the industrial countries. The gi Coefficients of these countries in all three equations has positive signs and are significant in one percent level. This applied conclusion remembers that economical performance in industrial countries can affect economical growth of NODCs and ALL LDCs. But results for oil exporters are different.

The gi coefficient in all 3 equations is not significant, so the theory of dependency of economical growth of these countries to economical growth of industrial countries is not valid[1].

The results for nominal and real interest show that only coefficients of nominal interest rate in 5% level are significant. This result improves the theory which is previously talked about nominal rate in economical growth.

Anyway coefficient of nominal interest rate is not valid in OXDCs and ALL LDCs. The real interest rate in all 3 groups in developing countries is not valid and this means that the real interest rate variable in economical growth is not important. If we compare the equations 14 & 15 results which is shown in

---

1- In equation no. 3 the gi coefficient is at level of significant of 5%.

table 1& 2 with equation 13 result in table 3, we can easily find that the results are alike. Table 3 shows that economical growth rate of industrial countries affect positively economical growth rate of NODCs & ALL LDCs and gi coefficient is not significant in OXDCs. This is because of lack of importance of this variable in economical growth of these countries. The real interest rate coefficients in all 3 groups of developing countries is not significant and only coefficient of nominal interest rate in NODCs is significant. The empirical results of equ. 13 are completely approving equ. 14 & 15. As we talked above, the real interest rate in economical growth of these countries do not have any effects and nominal interest rate is the only important variable in economical growth of NODCs. So, in contrast with "Callier" analyses the real interest rate in comparison with nominal interest rate has less importance.

Table 1 :The growth model encompassing nominal interest rate(1965-1985)

Coefficient	ALL LDCs +	OXDCs +	NODCs
Intercept	-1.2	7.97	2.93*
	-1.52	**1.07**	**1.68**
Gi	.39***	0.56	.29***
	3.32	**0.9**	**3.16**
N	-0.05	0.1	-0.12
	-0.53	**0.28**	**-2.14**
L	1.9***	-2.89	0.48
	2.61	**-1.82**	**0.81**
K	.06***	.14**	.07***
	3.43	**2.19**	**5.92**
R^2	0.82	0.48	0.84
DW	1.9	1.92	1.85
N	18	19	18

The bold numbers are t values.
*level of significance at10 %
** level of significance at 5 %
*** level of significance at 1 %
 + =first order self correlation
DW =Durbin-Watson-stat
N = number of observations

Table 2:The growth model encompassing real interest rate(1965-1985)

Coefficient	ALL LDCs +	OXDCs +	NODCs
Intercept	-1.91	9.15**	0.77
	-1.13	**1.58**	**0.48**
Gi	.42***	0.49	.37***
	3.72	**0.9**	**3.81**
N	-0.02	0	0
	-0.36	**0.04**	**0**
L	2.04***	-2.87	0.85
	3.08	**-1.79**	**1.3**
K	.05*	.13**	.06**
	1.6	**1.84**	**2.37**
R^2	0.82	0.47	0.8
DW	1.9	1.89	1.93
N	18	19	18

The bold numbers are t values.
* level of significance at 10 %
** level of significance at 5 %
*** level of significance at 1 %
 + =first order self correlation
DW = Durbin-Watson-stat
N = number of observations

Table 3:The growth model encompassing nominal and real interest rate(1965-1985)

Coefficient	ALL LDCs +	OXDCs +	NODCs
Intercept	-1.4	7.72	4**
	-0.56	**0.96**	**2.12**
Gi	.4***	0.56	.22**
	2.8	**0.88**	**2.07**
N	-0.03	0.11	-0.18
	-0.29	**0.28**	**-2.54**
R	-0.01	0.02	0.07
	-0.17	**0.09**	**1.3**
L	1.95**	-2.88	0.14
	2.49	**-1.74**	**0.22**
K	0.06	.14**	.1***
	1.35	**1.74**	**3.85**
R^2	0.82	0.48	0.86
DW	1.9	1.92	1.85
N	18	19	18

The bold numbers are t values.
* level of significance at 10%
**level of significance at 5%
*** level of significance at 1%
 +   =first order self correlation
DW = Durbin-watson-stat
N = number of observations

6- Applied Consequences about Iran

Equation 13, 14 and 15 for determining the effect of the economic growth of the industrial countries and the global rate of interest on Iran economy also are used, with only this difference that in regression equation the dummy variable also is used in all three equations so that to separate the pre and the post revolution (before 1987, the dummy variable was (zero) and from 1979 on has been (one)).

1- All three equations show that variations in economic growth of the developed countries has not have such an effect on Iran economic growth and the gi coefficients in all three equations are not meaningful. The applied consequences show that pre and post Iran economic growth has not been affected by the fluctuations and the applications of the developed nation's economic growth. After the revolution, due to economic isolation or economic incision of Iran economy from economy of the rest of the world, the effects of the economic fluctuations of the developed countries that mostly had sanctioned Iran and their economic relations with Iran was reduced to the minimum level, naturally have been very minimal and less important. Before the revolution, the conditions were also such that the windfall petro dollars were spent and the government used to sell the national wealth to cover its expenses. In those days the only main exporting product of country was petroleum and the income was spent to provide consumer and intermediate commodities. The inflow of capital during the government economic plans was not such a noticeable amount.

The highest amount of loan and private foreign capital received in 1357 was 550 million $. Of course, during previous years the entry of capital has been along with some fluctuations. Changes in the prices of the imported consumer commodities was also adjusted by the increase in petroleum prices which took place after 1973. These Situations have not been changed significantly for the Period of 1985-2002. Therefore, we can conclude that the econometric results of independency of the Iran economic growth to the economies of the main developed nations are logical and correct.

Table 4:Estimated regration about Iran(1965-1985)

Coefficient	Equation 15	Equation 14	Equation 13
Intercept	21.26	20.21	19.42
	3.1***	**2.51****	**2.39****
gi	-0.3	0.01	-0.13
	-0.43	**0.01**	**-0.16**
n		0.35	0.25
		0.65	**0.45**
r	0.2		0.18
	1.06		**0.92**
l	-3.46	-4.29	-3.74
	-1.74	**-2.11**	**-1.75**
k	1.77	1.57	1.94
	0.41	**0.36**	**0.44**
D	-18.35	-19.29	-19.17
	-6.05	**-5.39**	**-5.33**
R^2	0.78	0.77	0.78
DW	2.4	2.24	2.45
N	21	21	21
F	10.95***	10.34***	8.68***

The bold numbers are t values.
* level of significance at 10%
** level of significance at 5%
*** level of significance at 1%
+ =OLS
DW = Durbin-Watson-stat
N= number of observations
F = F value

2- The empirical consequences of the global rate of interest variable shows that it does not have such an impact on Iran economic growth. Due to the fact that Iran in pre revolution era (for having petroleum incomes) did not obtained vast loan from international monetary and financial centers and only in years 1352-1353, the not foreign capital balance of the country had a surplus of $ 925 million but, by and large, during years 53-56, the net capital account of the country shows a $ 6.2 billion deficit which implies the capital outflow from Iran.

In large Iran's pre revolution foreign debts was not noticeable enough that the changes in global rate of interest could have a serious effect on her economic growth. On the other hand, from that time on, Iran was also known as one of the capital exporting countries and Iran's loans to France, Egypt and ... is witness to this claim. Thus, empirical result indicates that independency of Iran's economic growth, in pre and post revolution to the rate of interest is acceptable. Also after the revolution Iran did not get such a noticeable loan from other countries. Following this subject, the variable of capital coefficient in the growth model also, has not been meaningful and it suggests that in pre and post revolution era, inflow of capital and investment did not play an active role in the economic growth of the country.

3- The meaningful variables in the growth model and in all three equations are labor force variable and dummy variable. The population growth rate as a substitute for labor force variable is used in the model and the coefficient in all three equations with negative sign at the 5 percent level is meaningful. The size of the coefficient in equations 13 and 15 are quite close to each other and in equation 14, with a bit difference indicates that one percent increase in population growth rate will result on a decrease of about 1.8 percent in economic growth. This shows to the economic planners that in the economic conditions of Iran, population growth is not to the benefit of Iran economy and has negative effects on economic growth.

4- About the consequences of labor force and capital, we should consider the following points:

A. Negativity of the labor force coefficient in the growth model is seen several times in applied studies. For example, table 5 shows that the labor force growth coefficient in "Ram Rati" model for Bolivia, Brazil, Pakistan and the

Table 5:The economical growth model of Ram Rati(1960-1982)

Country name	Method	R^2	X^0	K^0	L^0
AFGHANISTAN	OLS	0.24	0.24	-0.48	-2.49
			0.33	-0.93	-0.34
ALGERIA	OLS	0.72	.612*	-0.16	1.04
			6.26	**-0.61**	**0.37**
BOLIVIA	OLS	0.79	.18*	.56*	-13.30
			3.97	**5.22**	**-2.40**
BRAZIL	OLS	0.66	-0.04	1.023*	-6.66
			-0.66	**4.41**	**-2.27**
GREECE	OLS	0.54	.149**	-0.01	0.18
			1.79	**-0.03**	**0.10**
HONG KONG	OLS	0.53	.395*	0.34	0.09
			3.73	**1.43**	**0.12**
INDIA	AR1	0.32	0.04	-1.54	3.58
			0.40	**-2.31**	**0.36**
IRAN	OLS	0.52	.479*	0.14	6.19
			3.06	**0.32**	**0.46**
IRAQ	OLS	0.61	.407*	0.35	-8.49
			3.02	**1.06**	**-0.69**
PAKISTAN	OLS	0.47	0.06	0.01	-5.56
			1.50	**0.04**	**-2.19**
SOUTH AFRICA	OLS	0.44	0.00	.424*	-8.66
			0.03	**2.40**	**-2.26**

*=level of significance at 5%

**=level of significance at 10%

L^0 = rate of population growth(working force)

K^0 =rate of investment growth(used I/Y)

X^0 =rate of export growth

References: Ram Rati, "Exports and Economic Growth in Developing countries":
Evidence from Time-Series and Cross-Section Data".
Economic Development and Cultural Change, 1987, Appendix, Table A1

South Africa, despite being meaningful, has negative sign. Theoretical studies also indicate the same point. For example, based on a study done about the relation between total production and population "Nurkse" concludes that in many developing countries, marginal production in a point equals to zero and

from that point on, if population grows, marginal production becomes negative while, average production continues to decrease.

B. table 5 indicates that in many of the countries under study, namely Iran, there is not a relation between investment and economic growth. This study done by "Ram Rati" clearly indicates that in pre revolution era, investment had no effect in Iran's economic growth[1]. And this is an approval of the result of this article. By reviewing the outcomes of table 5 and comparing those with the results of table 4, we see that the outcomes of Pakistan very much resemble those of Iran. Anyhow, we must notice that the model designed in this article, is not about to study all the variables affecting economic growth, but it is just about to show the effects of growth of the industrial nations and the global rate of interest on Iran economic growth. In order to do this, a model is developed that basic variables such as capital and labor force be included[2].

5- The dummy variable coefficient in all three equations is meaningful, and with a negative sign and indicates that the post revolution conditions have been such that reversely affected the economic growth of the country. Study on economic conditions of the post revolution, strongly supports this point. Thus, this variable points out the worsening economic conditions of the post revolutions in the country and necessarily indicates that the economic and production structure should be changed, if not, the real growth will diminish strongly. In general, GNP in constant prices of 1367 equates to that of 1356. GDP that in 1363 was 3421 billion Rials in constant prices of 1353, diminished to the level of 2961 billion Rials in 1367. The above situations have not been significantly changed for the period of 1367-1380. If we assume that the population growth rate has been 3.2 Percent and 2 Percent for the Period of 1353-1367 and 1367-1380 accordingly, this trend of actual per capital production with the diminishing rate, in about 4.5 and 5 percent in the next ten years, in fact indicates the expansion of general poverty.

6- The F value in all three equations at the level of one percent is meaningful and changes in Iran economic growth in all three equations are defined by regression analysis. The R^2 coefficient in all three equations is close to 78.

---

1 - Ram, Rati, 1987, Table A1.
2 - See reference no.20 and No.22 .

Concluding Remarks

The empirical outcomes show that the growth of the petroleum importing countries (NODCs) and developing countries (ALL LDCs) are affected by the economic growth of the industrial countries. Never the less, there was no evidence to imply that economic growth of the petroleum exporting countries (OXDCs), including Iran, is related to the economic growth of the developed nations. This outcome may imply the difficulties of finding any economical relations between OXDCs countries and also Iran and the industrially advanced countries. Of course, the dependencies of the economic growth of developing countries to the developed nations are high enough that could balance the affects of the petroleum exporting countries on them.

The results of regression analysis show that the nominal rate of interest is vividly a meaningful factor affecting economic growth of petroleum importing countries (NODCs). In this case, nominal rate of interest is a macro economic factor which could help us in understanding the economic growth of developing nations and the ways that the economic growth of the developed countries affects the same growth rate in NODCs.

Also the results show that the economic growth of Iran pre and after the revolution has not been affected by the economic growth of the industrialized nations and does not show such sensitivity to the global rate of interest. On the other hand, the negative and meaningful coefficient of dummy variable, which is chosen as a benchmark for the post revolution economic transformations in Iran, indicates that, the economic structure of Iran in post revolution era has by no means satisfactory and if there should not be a restructuring and changes in economic conditions, the actual economic growth will have a diminishing trend.

References

1- Amuzegar, J., *"Oil Exporters, Economic Development in an Interdependent World"*, IMF Occasional Paper, 8, April 1983.

2- Balassa, B., *"Policy Responses to Exogenous Shocks in Developing Countries"* AER, 76 (May 1986): 75-78

3- .... *"Adjustment to External Shocks in Developing Countries"*, World Bank Slaff Working Paper, No. 742, 1981

4- Callier, P., *"Growth of Developing Countries and World Interest Rates"*, Journal of Macroeconomics, 6. Fall 1984.

5- Balassa, Barsony and Richards, *"The Balance of Payments Effects of External Shocks and policy Responses to these Shocks in Non-Oil Developing Countries"*, OECD, 1981.

6- Chu, Ke-Young, *"External Shocks and the Process of Fiscal Adjustment in a Small Open Developing Economy"*, IMF, 1987.

7- Fry, M. and Lilien, D. *"Monetary Policy Responses to Exogenous Shocks.* "AER, 76, May 1986.

8- Goldsbrough and Zaidi, *"Transmission of Economic Influences from Industrial to Developing Countries"*< IMF, July 1986.

9- Goldstein and Khan, *"Effects of Slowdown in Industrial Countries on Growth in Non Oil Developing Countries"*, IMF occasional paper, 12, 1982.

10- Hirshman, A, *"A Generalized Linkage Approach to Development"*, Economic Development and Cultural Change, 1977.

11- IFS, Year Book, IMF, 1980-1990.

12- IFS, Supplement on Output Statistics, IMF, 8, 1984-85.

13- IFS, Supplement on Trade Statistics, Supplement Series, No. 15.1988.

14- IMF, World Economic Outlook, 1980-91.

15- Lewis, W. Arthur, *"The Slowing Down of the Engine of Growth"*, American Economic Review, 70, Sept. 1980. 555.

16- Meier, Gerald, Leading Issues in Economic Development, Fourth Edition, 1984.

17- Minsky, H. P. John Maynard Keynes, N.Y. Columbia University Press, 1975.

18- OPEC Bulletin, Oil: Myth and Reality, 12 , April 1981.

19- Ram, Rait, *"Exports and Economic Growth in Developing Countries: Evidence from Time-Series, and Cross-Section Data,* "Economic Development and Cultural Change, 1987.

20- Rahimi borougerdi, Alireza, *"The Effects of Major Exogenous Shocks on the Growth of Non-Oil Developing Countries'*, Economics and Management, Vol.3, Fall 1989. PP. 113-126.

21- Rahimi boroujerdi, Alireza, *"Growth of Less Developed Countries and international Interest"*, Economics and Management, Islamic Azad University, Vol. 6. Fall 1990, PP. 5-16.

22- Rahimi boroujerdi, Alireza, *"The role of international Trade in the Economic Growth of Oil-Exporting Developing Countries"*. Tahgighat-E-Eghtesadi, No. 43, spring and summer 1370, University of Tehran, PP. 31-53.

23- Ragnar Nurkse, *"Excess Population and Capital Construction"*, Malayan Economic Review, October 1957.

24- Tabellin I, G., *"Fiscal Policy Responses to the External Shocks of 1979 in Selected Developing Countries, Theory and Facts"*, IMF, December 1985.

25- Tanzi, Vito, *"Fiscal Policy Responses to Exogenous Shocks in Developing Countries"*, AER, 76, May 1986.

26- Trade and Development Report, 1993, United Nations Conference on Trade and Development, United Nations, New York, 1993.

27- World Development Report, World Bank, 1985-90.

28- World Economic Outlook, International Monetary Fund, 1980-93.