

The Optimum Level of Non-Oil Exports: A Theatrical Proposal on Iran's Case

By:

Seyed Javad Pourmoghim *

Abstract

Iran is one of the biggest oil producer and exporter of the world. Due to the special administrative and constitutional structure of the country, i.e. economic, social and political reasons, the government budget and revenues depend heavily on oil exports.

The aim of this article is to suggest a theoretical proposal on the optimum level of non-oil exports such that it will clear up the idea of export promotion of non -oil exports and being " independent of oil revenues" not only for official authorities, but also be appropriate and meaningful for the economic agents to continue the proper activities.

In order to reduce the dependence on oil revenues a level of non-oil exports should be considered such that the expected costs of holding this level are minimized. This optimum level has been analyzed with the selected strategy arising from the administrative and legal structures.

The optimum level with respect to a benchmark was estimated, and finally analyzed and compared the relationship between the actual level and the optimum level of non-oil exports.

Keywords: Optimum, Non-Oil export, Oil revenues, Portfolio, Minimizing, Export Promotion.

1- Introduction

Iran is among the top-ten oil producers and exporters of the world. The government has been dependent on the oil revenues. This dependency has long been institutionalized by special administrative and constitutional structure of the country, i.e., economic, social and the political. Thus the government's budget and revenues depend heavily on oil exports. However, the idea of promoting non-oil exports and becoming independent of oil revenues is one of

* - Department of Economics, Azzahra University, Vanak, 19834, Tehran, Iran.
E-mail: sjmoghim@yahoo.com.

the most important policies of Iranian government. The official authorities and economic experts, in general, have reiterated this idea. But it seems that this concept is not quite clear for the economic agents, and even for the official authorities, therefore, it seems note worthy to raise a few questions such as: what the appropriate definition of the level and combination of exports is? What level of desirable non-oil exports is? What the optimum level of non-oil exports is? What the roles of private and public sectors are in determining this optimum level of non-oil exports? And, finally how the relationship between the optimum level of non-oil should exports, on the one hand, and the government revenues and budget, on the other, be?

Due to nature of the administrative and constitutional structure of the country, i.e. economic, social and the political, the government budget and revenues depend heavily on oil exports. In fact, the revenue of oil exports is an inseparable part the government budget. The interdependence of the oil exports revenues and the government budget is so close that it can be referred to as the "twin concepts of budget and oil exports".

The aim of this article is to put forward a theoretical proposal on the optimum level of non-oil exports such that it hopefully will clarify the idea of export promotion of non -oil exports and also that of becoming "independent of oil revenues. This clarification is "not only meant for implementation by the official authorities, but is also intended to be appropriate and meaningful for the economic agents to continue the proper activities. In other words, the present article will attempt to provide an appropriate design for the production and export of non-oil commodities and manufactured goods.

In section two, an analysis of the current level and combination of export operations is offered and in section three, a model concerning the optimum level of non-oil exports is proposed. Section four is devoted to the practical results. And, finally, in section five concluding remarks will be discussed.

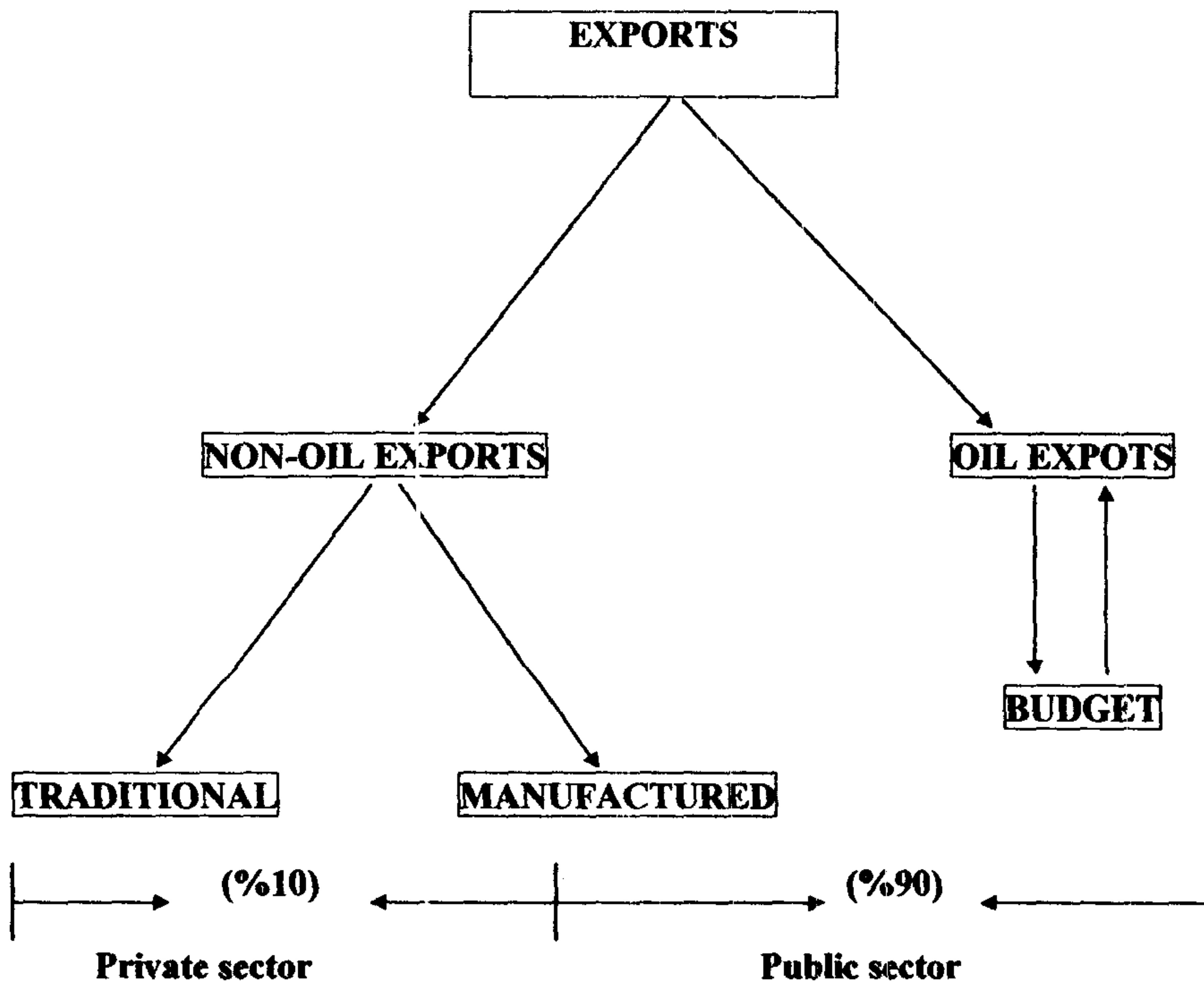
2- Review of Current Exports Operations

The analysis of the extant data shows that about 90 percent of total exports of Iran are oil and the rest is non-oil exports commodities. . Due to the constitutional structure of the country traditionally the export of oil takes place by the government, that is, the government has monopoly power over oil exportation and its revenues.

The foreign exchange obtained from oil exports is also traditionally submitted to the central bank and on the basis of official exchange rate, its equivalent in Rials- Iranian money- is paid to the treasury. This settlement or liquidation is usually brought in budget as a government income item. Table 1 shows the percentage of oil and gas revenues, tax revenues and revenues from

the sales of foreign exchange in the total government revenues. They are about 60, 22, and 14.5 percent of the total government revenues respectively. The government and private sector's shares in exports are shown in fig. 1. On the basis of these figures 90 percent of total exports belong to the government and only 10 per cent of it belongs to the private sectors. These figures also show the relationship between oil exports and government budget.

Fig 1: Government and private sector's Shares in exports



**Table 1: The ratio of oil revenues, tax revenues, and revenues from the sales of foreign exchange to total government revenues
(In billions of Iranian Rials, and percentages)**

| YEAR* | TOTAL REVENUES | OIL REVENUES | TAX REVENUES | RVENUES FROM SALES OF FOREIGN EXCHA-NGE | RATIO OF OIL REVENUES TO TOTAL REVENUES | RATIO OF TAX REVENUES TO TOTAL REVENUES | RATIO OF REVENUES FROM THE SALES OF FOREIGN EXCHANGE |
|---------------------|-----------------------|---------------------|---------------------|--|--|--|---|
| 1994/95 (1373) | 33482 | 23908 | 5491 | 240 | 71.4 | 16.4 | 0. |
| 1995/96 (1374) | 45156 | 29431 | 7313 | 2765 | 65.5 | 16.2 | 6.1 |
| 1996/97 (1375) | 62056 | 38153 | 12560 | 5407 | 61.5 | 20.2 | 8.7 |
| 1997/98 (1376) | 70012 | 37493 | 17345 | 10429 | 53.5 | 24.8 | 14.9 |
| 1998/99 (1377) | 62881 | 22530 | 18686 | 5932 | 35.8 | 29.7 | 9.4 |
| 1999/2000 (1378) | 112071 | 51408 | 25831 | 25453 | 45.9 | 23.0 | 22.7 |
| 2000/01 (1379) | 150212 | 82961 | 33961 | 58876 | 55.2 | 22.6 | 39.2 |

Sources: Ministry of Economy and Finance; and Bank Markazi Jo muouri Islami Iran (Central Bank); and IMF Staff Country Reports, Islamic Republic of Iran: Statistical Appendix, table 25

*- Iranian years ending March 20.

3- Theoretical Model of the Optimum Level of Non-Oil Exports

3. A- Background of the Model

The first question to be considered is that in the process of increasing and diversifying the non-oil exports, what will be the optimum level of non-oil exports? Moreover, what are its impacts on government revenues? For example, will a decrease in the oil exports and its substitution with non-oil exports cause a reduction of government revenues in budget due to the decrease in the oil exports revenues?

In fact, the question is how the government can solve this problem? Obviously, reduction of government revenues has a close relationship with the role of public and private sectors' exportation of non-oil commodities and services. Consequently, the optimum level of non-oil exports has a close relationship with the role of government and that of private sectors in exports and with the way the reduction of government oil revenues are financed.

Obviously, in exporting non-oil commodities of the country the comparative advantages should not be overlooked. However, the recognition of the comparative advantages and disadvantages and specially their interpretation and their measurements do not concern this article.

Now, it is realized that the level and composition of non-oil exports depend on the view of the government on how to finance its expenditures, and not on the basis of comparative advantages. That is, the level and composition of exports should be such that they guarantee this view of the government. Although, the general presumptions are that the level and composition of optimum exports should be defined on the basis of comparative advantages.

What kind of definition is capable of covering the view? And how the optimum level of non-oil exports should be explained? Non-oil exports have different definitions and interpretations with respect to their expected levels. Consequently, before suggesting a theoretical model of optimum level of non-oil exports, we might give a brief definition of different approaches as what follows:

- The optimum level of non-oil exports is that level where the budget deficit will be near zero;
- The optimum level of non-oil exports is the level that minimizes the dependence of government on the oil revenues;
- The optimum level of non-oil exports is the level that not only is a source of financing foreign exchange, but also financing a portion of government budget, and
- The optimum level of non-oil exports is that level that guarantees appropriate and definite revenue for government.

Traditionally, for administrative, legal, economic, social, and political reasons, government budget and oil revenues are intertwined. That is, on the one

hand, dependence of the government on the exports of oil and the current and capital expenditures are cause of survival and growth of this twin and hence the income from oil exports is a main source of the government budget. On the other hand, there is a new view about export promotion and becoming independent from oil revenues. It seems that the idea of privatizations to the extent of being independent of this traditional view and promoting non-oil exports in order to reach the optimum level is the best solution to the dilemma at hand.

With respect to these two different views, several different strategies are recommended and represented in table 2.

Table 2 : Recommended Strategies

| Strategies | Characteristics |
|-------------------|---|
| First | <ul style="list-style-type: none"> -To continue and keep the current shares of public and private sectors in trade; -To change the level and composition of exports of government; -To diversify the income, local currencies and foreign exchange, such as: <ul style="list-style-type: none"> -Diversification of exports by government -Increase sources of tax revenues. -Issuance of government bonds (securities). |
| Second | <ul style="list-style-type: none"> -Reduction of government shares in total exports by reducing or stopping oil exports. -Promotion and transfer of non-oil exports to private sector; -Increase tax revenues and its resources, and -Issuance of government bonds |
| Third | <ul style="list-style-type: none"> -Reducing and stopping oil exports and issuing government bonds on the basis of underground assets; -Continuing to decrease the government share in non-oil exports; - Continuing to promote non-oil exports by private sectors; -Increasing tax revenues, and -Choosing an appropriate foreign exchange system on the basis of priority of economic development planning |

The recommended strategies as contained in table 2 are based on the two prevalent views in the country. Each strategy is accessible gradually. However, the first strategy is recommended because of the current structure and traditional approaches to the issue. While the third strategy shows a situation in which the government is changing the traditional approach with regard to the new ideas in the country.

It seems that due to the:

- 1- Administrative and legal structural reasons,
- 2- Economic, social, and political reasons, and
- 3- The necessity of currencies and foreign exchanges in order for the budget to finance the economic development planning and solve the problem of balance of payments.

The first strategy is feasible and sensible.

The first strategy dominates the government behavior. Of course, it is possible to omit the above-mentioned constraints gradually in order to shift to other strategies. Hence, with regard to the first strategy, an attempt is made to suggest a theoretical view on the optimum non-oil exports.

To substitute oil revenues in the budget just by raising income taxes is not possible. That is, the tax capability, slow increase in national income, low efficiency of tax receipts, income distribution, tax avoidance, tax evasion, all are constraints which could decrease the compensation of reduction of oil revenues in the budget just by raising income taxes.

In other words, government should issue government bonds and gradually substitute income taxes.

Of course, the government can increase the tax revenues; higher tax rate, higher tax revenues. But from a theoretical point of view there is a maximum tax rate, and tax revenues decrease by extra increase in tax rates (Laffer curve). There are no immediate solutions for the dilemma between tax revenues and oil revenues in the government budget; however, whatever approach is taken it should be done gradually. In this case, it is believed that issuing government bonds should compensate for the budget deficit.

These structural constraints are such that it is expected the government will adapt to the first strategy. That is, the government should change the oil revenues to revenues from non-oil exports, which is undertaken by the public sector. Hence the government can diversify the portfolio of financing resources. In other words, one expected income is substituted by several expected incomes. Obviously, as expected income is different from the actual income, the use of standard deviation criteria should not be neglected.

It must be remembered that uncertainty dominates in export revenues and also on the other hand, foreign exchange revenues obtained from non-oil exports is a source of financing government. Uncertainty is risk. The rate of return on export revenues is defined and considered as financing a specific amount of government revenues. It should also be remembered that there is a relationship between the risk (uncertainty) and financing government revenues (returns). The more uncertainty (risk), the more returns. That is, there is a direct relationship between uncertainty and financing the government.

3B- Theoretical Model

We can say that the optimum level of non-oil exports is that accumulated income by which the government is able to use it in order to compensate for the budget deficit, and to finance foreign exchange needs. In accordance with standard procedures, this level will be optimum whenever the government minimizes the cost of holding of its income and benefits. Consequently, it is assumed that the government minimizes the expected costs of this optimum level. These costs in the first place consist of opportunity cost of foregone tax revenue in the case of revenue for non-oil exports and other incomes and secondly they consist of social costs in the case of zero non-oil exports revenues, each state is multiplied by its probability, i.e.

$$E(C) = \alpha C_0 + (1 - \alpha)C_1 \tag{1}$$

Where C_0 is social cost of default of non-oil exports and α is its probability. C_1 is the cost of foregone tax revenues in the case of positive non-oil exports revenues and other incomes and $(1 - \alpha)$ is its probability.

Some empirical studies have suggested that a stable relationship exists between risk (α) and economic variables. In this framework, risk depends on economic variables such as ratio of non-oil export revenues to the value of imports, the ratio of oil export revenues to the value of imports, and the ratio of non-oil export revenues to the total government revenues, and so on.

$$\alpha = \alpha \left(\frac{b_1}{m}, \frac{b_2}{m}, g, z_i \right) \tag{2}$$

That, “ b_1 ” and “ b_2 ” are revenues from non-oil and oil exports respectively; “ m ” is the value of imports, “ g ” is the ratio of the non-oil export revenue to the government revenues or in other words is the degree of dependence of budget to non-oil export revenues, and “ z_i ” represents other variables in the probability

(risk). An increase in the ratio of $\frac{b_1}{m}$ reduces the risk, and an increase in the

ratio of $\frac{b_2}{m}$ increases risk. In addition an increase in “ g ”, the degree of dependence of budget to non-oil exports, also reduces risk.

With respect to the link of export sector and economic growth, default of the non-oil export revenue reduces the speed of economic growth. Hence, we can measure the cost of default of non-oil exports revenues, C_0 ; it can be

measured as the present value of the difference between the actual income after default, “ Y_t “, and potential income, “ Y_t^p ”, that is:

$$C_0 = \sum_{t=0}^n (Y_t^p - Y_t) \eta^t \quad (3)$$

Where: Y^p = potential national income,
 Y_t = actual national income,
 η = The annual discount factor

$$Y_t^p = Y_0 (1 + g_r)^t \quad (4)$$

That “ gr ” is the rate of national income growth (which we consider it, on average, 4 percent in the period under study) and Y_0 is income in the preceding default.

The cost of default of non-oil export revenues can be represented as:

$$C_0 = f(g_d) \quad (5)$$

Where “ gd ” stands for the government budget deficit. That is, default of non-oil export revenues cause an increase in the budget deficit, and borrowing from banking system.

The opportunity cost of having non-oil export revenues means the foregone tax revenues. The rate of return on the export revenues is, in fact, the difference of the rate of foregone tax revenues and interest rate

$$C_t = \rho b_t \quad (6)$$

Where $\rho = (t - i)$, and “ t ” is the rate of foregone tax and “ i ” is the interest rate.

With respect to above relations the problem is to minimize the expected cost, that is:

$$\text{Min } E(C) = \alpha C_0 (g_d) + (1 - \alpha)\rho b_1 \tag{7}$$

s.t.

$$\alpha = \alpha \left(\frac{b_1}{m}, \frac{b_2}{m}, g, z_i \right) \tag{8}$$

The first and the second derivations are respectively as:

$$dE(C) / db_1 = E(C)_{b_1} = \alpha_{b_1} (C_0 - \rho b_1) + (1 - \alpha)\rho = 0 \tag{9}$$

$$\frac{d^2 E(C)}{dn_1^2} = E(C)_{b_1 b_1} = \alpha_{b_1 b_1} (C_0 - \rho b_1) - 2\alpha_{b_1} \rho > 0 \tag{10}$$

We know from the first –order condition that if a solution exists, it can be written as:

$$b_1^* = b_1 (C_0, \rho, b_2, g, z_i) \tag{11}$$

Where b_1^* is the optimum level of non – oil exports.

4- Practical Results

To solve the first order condition and to obtain an answer, we consider a benchmark model with the numerical assumptions as

Table 4: Benchmark Model

| Assumed number | Variable and parameters |
|----------------|-------------------------|
| 50* % | α |
| 50 % | ρ |

* Of course the optimum level was also calculated by %40 and %20 Respectively but they had no effect on the obtained optimum level.

That is, we assume the probability and risk of having non-oil exports 50 percent which is also the rate of net tax. Just in case, if the government wants to finance its expenditures entirely by taxation, it seems this rate, on average, should be 50 percent, which is a usual and logical rate from economic point of

view. We consider the net rate at a level, which will enable the government to finance its expenditures from tax revenues (taxation).

Equation (9) can not be solved explicitly for “ b_1^* ”. We thus run a simulation for each year, solving for “ b_1^* ” in the first-order condition.

The optimum level of the non-oil export revenues for each year of the sample period was simulated using $C0$, i.e. the estimate of national income foregone in case of default. The opportunity cost of having non-oil export revenues,” ρ “, and the determinants of probability.

Actual and optimum level of non-oil export revenues is presented in fig. 2 where the correspondence between actual and optimum non-oil export revenues is obtained by running the regression “ $b_{1t} = e + f b_{1t}^* + u_t$ ” The joint hypothesis is $e=0, f=1$. The results are

$$b_1 = -0.108 + 0.357 b_1^*$$

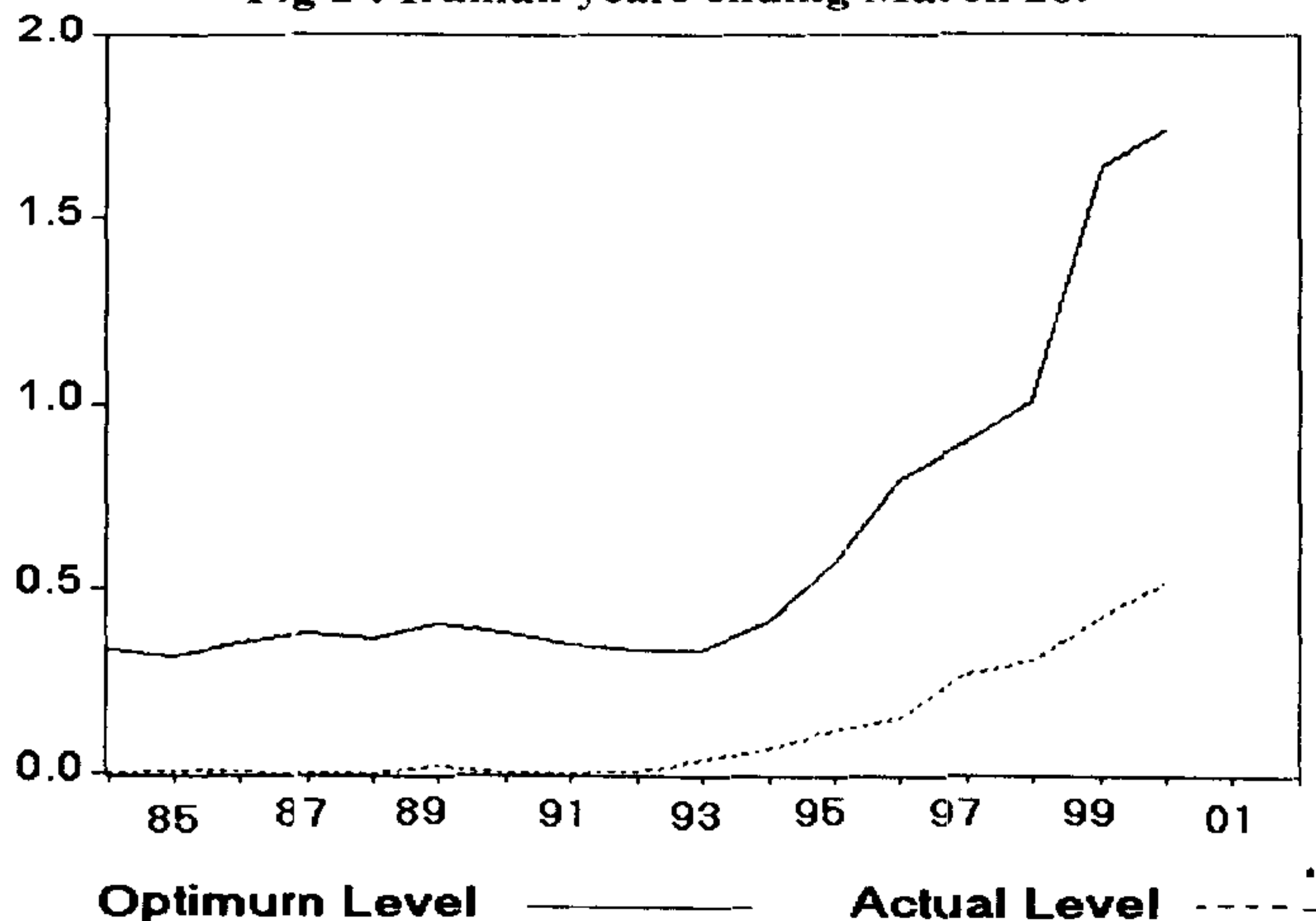
(-8.09) (20.37)

$$R^2 = 0.96$$

$$D.W. = 1.83$$

As can be seen, the coefficient of “ b_{1t}^* ” differs significantly from unity, and therefore the null hypothesis of the constant is rejected

Fig 2 : Iranian years ending March 20.



5-Concluding Remarks

This article has presented an argument that in order to reduce oil revenues and hence achieve independence of it, a level of non-oil exports should be considered such that the expected costs of holding this level are minimized. This optimum level has been analyzed with the selected strategy arising from the administrative and legal structures.

The link between government budget and oil revenues, in other words, the twin concepts of budget and oil revenues, from old times, has come into existence from the administrative and legal structures of the country and gradually has extended such that at the present time about 60 percent of budget is financed by oil revenues. Besides, the idea of export promotion of non-oil commodities dictates a special strategy for the level and composition of non-oil exports. This article reviews these two contradictory ideas and views, and suggests a theoretical model on the optimum level of non-oil exports such that the government should be able to reduce its dependence on oil revenues.

In the theoretical model, we minimize the expected costs of holding the optimum level and consider two kinds of costs: first the opportunity costs of foregone tax revenues in the case of having non-oil revenues and other incomes and second the social cost of default of non-oil revenues.

We considered budget deficit, the degree of dependence of budget to non-oil exports, and oil and non-oil revenues as the main effective factors in calculating this diversified portfolio. We estimated the optimum level with respect to a benchmark model (with arbitrary assumptions of some parameters), and finally we analyzed and compared the relationship between the actual level and the optimum level of non-oil exports.

With respect to new views about the government's share in economic activities, especially about the approach of financing government expenditures, we suggest other strategies. Operating these strategies requires the adjustment of the administrative and legal structures and also reduction and omission of the social and economic reasons until the government is able to finance its expenditures mainly by taxation, with respect to its three roles_ optimum resource allocation, income redistributions and economic stabilization.

References

- 1- Alier, M., and M Kaufman, 1999, "Nonrenewable Resources: A Case for Persistent Fiscal Surplus," IMF Working paper 99/44, April 1999.
- 2- Anderson, T.W., and Cheng Hsiao, 1982, "Formulation and Estimation of Dynamic Models Using Panel Data," *Journal of Econometrics*, No.18, pp. 47-82.
- 3- Arrow, K.J., T.Harris and J.Marschak, 1951, "Optimal Inventory Policy," *Econometrica*, 19, pp.250-272.
- 4- Azoury, K.S., 1985, "Bayes Solution to Dynamic Inventory Models Under Unknown Demand Distribution," *Management Science*, 31, pp.1150-1160.
- 5- Barro, R., 1971, "On the Determination of the Public Debt," *Journal of Political Economy*, 85 No. 5, 940-971.
- 6- Bikhchandani, S. and S. Sharma, 1996, "Optimal Search with Learning," *Journal of Economic Dynamics and Control*, 20, pp. 333-359.
- 7- Boylan, E.S., 1986, "Stability Theorems for Solutions to the Optimal Inventory Equation," *Journal of Applied Probability*, 6, pp.211-217.
- 8- Chenery, H.B and Strouit, A.M. 1966, " Foreign Assistance and Economic Development," *American Economic Review*, No. 56 (September), pp. 680-90.
- 9- Cooper, R.N., 1968, "The Relevance of International Liquidity to Developed Countries," *American Economic Review* (May).
- 10- Deaton, A., 1991, "Saving and Liquidity Constraints," *Econometrica* 59 No. 5. Pp.1221-48.
- 11- Engel, Edvardo, and Rodrigo Valdes, 2000, "Optimal Fiscal Strategy for Oil Exporting Countries," *IMF Working Paper 00/118* (Washington: International Monetary Fund).
- 12- Frenkel, Jacob and B. Jovanovich, 1981, "Optimal International Reserves: A Stochastic Framework," *Economic Journal*, Vol.91, pp.507-14.
- 13- Heller, H. Robert, 1966, " Optimal International Reserves," *Economic Journal*, Vol.76(June), pp.296-311.
- 14- Jappelli, Tullio, and Macro Pagano, 1994, "Saving, Growth and Liquidity Constraints," *Quarterly Journal of Economics*, 109(1), pp.83-109.
- 15- Kimball, M., 1990, "Precautionary saving in small and in the large," *Econometrica*, 58, 53-73
- 16- Ministry of Economy and Finance; and Bank Markazi Jomouori Islami Iran (Central Bank); and IMF Staff Country Reports, Islamic Republic of Iran: Statistical Appendix, table 25

