Studying the effects of macroeconomic variables on non-oil exports in Iran

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ABSTRACT

This study aims to examine the effects of macroeconomic variables on non-oil exports in Iran, for the period of 1965-2010. The paper employs the ordinary least square (OLS), unit root tests and co-integration technique of Johansen as analytical tools. Result found indicates that the positive significant effects of real gross domestic product and free market exchange rate on non-oil exports. While, the effect of inflation rate on non-oil exports have been found insignificant with unexpected positive sign.

Introduction

One of the most important factors to achieve sustainable economic growth is export promotion which forms the main objective of the foreign trade policy. In Iranian economy, without a doubt the most important feature is its high dependence on oil revenues that due to the volatility in oil prices leads to different problems in the economy, such as structural imbalances in various sectors and reducing in export earnings. Hence, non-oil export growth and increase in country's share in world trade and international markets is considered as one of the targets for the purpose of reducing the high dependence of the economy on oil revenues and release of mono-product economy. Therefore, this paper attempts to examine the effects of macroeconomic variables on non-oil exports in Iran for the period of 1965-2010. The paper utilizes econometric techniques to test the above mentioned effects via three hypotheses: (i) real gross domestic product has direct effect on non-oil exports, (ii) exchange rate in free market has direct effect on non-oil exports, and (iii) inflation rate has adverse effect on non-oil exports.

The study is structured into five sections. The following section contains literature review. In section III the methodology and data are presented. Section IV presents the empirical results, and in the last section, conclusions and suggestions are presented.

Literature Review

The role of exports as an engine for economic growth is a constant subject of debate in the economic growth literature. The classical economist Adam Smith argues that trade stimulates the economic growth through exports of surplus. He developed the theory of absolute advantage, was the first to explain why unrestricted free trade is beneficial to a country. Smith argued that 'the invisible hand' of the market mechanism, rather than government policy, should determine what a country imports and what it exports. Two theories have been developed from Adam Smith's absolute advantage theory. The first is the English neoclassical economist David Ricardo's comparative advantage. Two Swedish economists, Eli Hecksher and Bertil Ohlin,

develop the second theory. Hecksher-Ohlin's theory suggests that factor endowments, often based on natural conditions, are the major determinants of comparative advantage among countries in the trade of merchandise goods (Krugman and Obstfeld 2000). Thus a country with relatively more abundant labor will be able to produce relatively more labor-intensive goods for exports. Other nations with relatively more abundant capital will be able to produce relatively more capital-intensive goods. The Heckscher-Ohlin theory is preferred on theoretical grounds, but in real-world international trade pattern it turned out not to be easily transferred, referred to as the Leontief paradox. Another theory trying to explain the failure of the Hecksher-Ohlin theory of international trade was the product life cycle theory developed by Raymond Vernon.

In this regard, many studies such as Balassa (1978 and 1985), Jung and Marshal (1985), Ram (1985 and 1987), Chow (1987), Shan and Sun (1988), Ahmad and Kwan (1991), Bahmani-Oskoee and Alse (1993), Ekanayake (1999), Vohra (2001), Yadollahzadeh Tabari and Nasrollahi (2010), Mehrara and Adabi Firouzjaee (2012), Ersungur et al. (2012), etc have argued on the effects of exports on economic growth in developing countries. But, there is rarely any study assessing the implications of set of macroeconomic variables such as gross domestic product, exchange rate and rate of inflation on non-oil exports. Naderi, et al. (1990) argued that as long as Iran's economy depends on a product (oil), it cannot be healthy. Hence, the export promotion of traditional, industrial and agricultural products in development plan is of particular importance. Mehnatfar and Khakpour (2005) supported them and discussed that due to the sharp increase in population, declining oil revenues and oil price volatility, has no choice, except that a greater emphasis on non-oil exports. For this reason, use of actual and potential comparative advantages in foreign trade, diversifying non-oil exports can be an effective step to reduce reliance on oil revenue and create more stable conditions for all economic sectors.

In the case of non-oil exports, several studies have been performed in the world, including: Ilegbinosa et al. (2012) investigated the impact of macroeconomic variables on the performance of the Nigerian economy from 19686-2010. The results of analysis indicates that exchange rate, government capital expenditure and government recurrent expenditure are positively related to non-oil export, agricultural sector, manufacturing sub-sector and gross domestic product, while interest rate is negatively related to non-oil export, agricultural sector, manufacturing sub- sector and gross domestic product. Fakhri and Ilham (2010) investigate the impact of the real exchange rate on non-oil exports in Azerbaijan by applying Vector Error Correction Model. The estimation results suggest that real exchange rate of Manat has negative impact on non-oil export performance while non-oil GDP affects positively in the long and short run. Klein (2010) investigated inter- sectoral linkage between oil and non-oil sectors in a cross-country perspective. The paper shows that the applicability of "natural resource curse" across oil-based economies should be treated with caution as the externalities of the oil sector highly depend on the countries' degree of oil-intensity. In particular, the results show that, in low oil-intensity economies, the incentives to strengthen both fiscal and private sector institutions lead to positive inter-sectoral externalities. In contrast, weaker incentives in high oil-intensity economies adversely affect fiscal and private sector institutions and consequently lead to negative inter-sectoral externalities.

Also, several studies have been conducted on Iran's non-oil exports, including: Taghavi and Nematizadeh (2004) investigate the effect of macroeconomic variables on non oil exports during 1971-2001 and also to foreseen this effect for the coming years. In this research VAR econometric Model has been used. The results show that GDP and foreign exchange rate have had direct effect on the non-oil exports and the rate of inflation on the non-oil exports has been approximately affectless. The results of foreseeing during 2001-2012 also show that GDP had no effect on the non-oil exports and in this regard simulating model has been provided, too. Shakeri (2005) estimated the impact of price and non price variables on non-oil exports of Iran. The non-oil exports are considered to be a function of monetary variables, such as the exchange rate, inflation rate, and two non-price variables as productivity and competitiveness. The ARDL technique has been used to estimate the relation. The results indicate that the non-price variables play a significant role in promoting non-oil exports in Iran. Free exchange rate, though had positive sign, are not that important. Tayyebi and Mesrinezhad (2002) considered the effect of inflation on supply of Iran's non-oil exports for the period 1961-1999. A theoretical framework is specified and then is estimated by the Johansen-Juselious method (1990) for the long- run. The short-run relationships are also estimated by the Error-Correction Model (ECM). Overall, estimation results obtained indicate that inflation variable has significantly negative impact on non-oil exports in the long-run, whereas the real effective exchange rate and gross domestic product (GDP) affect positively supply of such exports. The results estimated for short-run behavior of exports also show that the short-run effect of inflation rather than its long-run effect is significantly negative on the supply of non-oil exports. Jafari Samimi, et al. (2012) studied the relationship and impacts of uncertainty in currency exchange rate on exports during 1978-2008 in Iran. The results of this assessment have been generalized by using the Generalized

Auto-regressive Conditional Heteroskedasticity (GARCH) and ordinary Auto-regressive Conditional Heteroskedasticity (ARCH) show that uncertainty in real exchange rate during the period subject of study had negative impacts on exports in Iran. Abrishami et al. (2009) investigated the impact of globalization on non-oil exports in Iran based on monetary and non-monetary factors through application of GMDH neural network model. The research has used international trade integration criteria and trade openness index as indices of globalization. The findings of this research illustrate that the impact of the growth of the world income and the growth of imported capital goods on non-oil exports in Iran is more important than the effect of other factors in globalization process. Furthermore this study concludes the growth of GDP as an internal factor has a significantly major effect on increasing non-oil exports.

Methodology

Data and Estimation Technique

The study involves quantitative analysis of the variables used in this research, adopting the method of Ordinary Least Squares (OLS) econometric statistical technique as an analytical technique, unit root tests and Johansen co-integration approach. Also, E. views computer software has been used for results derivation. This study made use of secondary data. They include the annual series data on: non-oil exports, exchange rate in free market, real gross domestic product, inflation rate from 1965 to 2010. These data have been taken from Iran's Statistical Yearbook of Foreign Trade, Iran's central Bank Publications and Internet Sites.

In this study, non-oil export (NOE) is the dependent variable, while the macroeconomic variables of real gross domestic product (GDP), exchange rate in free market (EXR) and inflation rate (INF) are the independent variables or the explanatory variables.

Model Specification

The following model is suggested for estimating non-oil export equation during the study period of 1965-2010:

$$NOE = f(GDP, EXR, INF)$$

The symbolic form of the log linear regression model of above equation is given as follow:

$$\ln(NOE) = C + \alpha_1 \ln(GDP) + \alpha_2 \ln(EXR) + \alpha_3 \ln(INF) + \alpha_4 AR(1) + \alpha_5 MA(2)$$

Where

NOE	= non-oil exports
GDP	= real gross domestic product
EXR	= exchange rate
INF	= inflation rate
C	= intercept
α_i	= variables' coefficient
AR (1)	= first degree auto-regressive error
MA (2)	= the second type of moving average

Empirical Results

Regression Analysis

This section provides an empirical test and analysis of data sourced for this study using the economic approach of Ordinary Least Square (OLS) methods. Econometric equation is estimated to test the hypotheses. Using the annual time series data for the period 1965-2010 as presented to test the hypotheses in this study, the ordinary least square regression yield the results which are given in table (1) in details. The following equation shows the estimated regression equation of macroeconomic variables:

NOE = - 44.1 + 3.2 GDP + 1.2 EXR + 0.31 INF + 0.86 AR (1) + 0.06MA (2)

R^2 = 0.97   Adjusted R-Squared = 0.97 D.W = 2.22 F = 293.61

Now, according to estimated model, research's hypotheses can be examined:

(i) Real gross domestic product has direct effect on non-oil exports.

(ii) Exchange rate in free market has direct effect on non-oil exports.

(iii) Inflation rate has adverse effect on non-oil exports.

Table (1) reveals that real gross domestic product has been found positively significant at %1 level of significance. The study hypothesized positive relationship between real gross domestic product and non-oil exports and result found strongly support the study hypothesis. The coefficient size found 3.2 and indicates that one unit change in the real gross domestic product will bring 3.2 unit changes in the total non-oil exports in the country. Another variable is exchange rate which has been found with expected positive sign and statistically is significant at %1 level significance. In other words, there is positive significant relationship between exchange rate in free market and non-oil exports. Likewise, in case of exchange rate the coefficient size found 1.2 and indicates that one unit changes in exchange rate in free market will bring 1.2 unit changes in non-oil exports in the country. However, inflation rate has been found with unexpected positive sign. According to economic theories the effect of inflation rate on exports is inversely. But, in this study, the sign of inflation rate variable is positive.

Table 1: Simple Regression Model

Dependent Variable: NOE
Method: Least Squares
Sample (adjusted): 1966 - 2010
Included observations: 45 after adjustments
Convergence achieved after 17 iterations
MA Backcast: 1964 - 1965

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	-44.10856	14.47803	-3.046587	0.0041
GDP	3.268215	1.189075	2.748535	0.0090
EXR	1.262242	0.420514	3.001667	0.0047
INF	0.319805	0.184385	1.734446	0.0907
AR(1)	0.860679	0.073457	11.71680	0.0000
MA(2)	0.066863	0.167947	0.398123	0.6927

R-squared	0.974122	Mean dependent var	6.211681
Adjusted R-squared	0.970804	S.D. dependent var	3.357735
S.E. of regression	0.573731	Akaike info criterion	1.850253
Sum squared resid	12.83752	Schwarz criterion	2.091142
Log likelihood	-35.63070	Hannan-Quinn criter.	1.940054
F-statistic	293.6109	Durbin-Watson stat	2.221671
Prob(F-statistic)	0.000000		

Inverted AR Roots	0.86

Source: Author's computation from E- views version 6

Unit Root and Co-integration Tests

The Augmented Dickey-Fuller (ADF) unit root test was applied to the logarithms of the four time series employed in the study (NOE, GDP, EXR, and INF) with and without time trend.

Table (2) reports the empirical results of the (ADF) unit root tests. The results indicate that none of the reported t-statistics for NOE, GDP, EXR, and INF were close to the 5% critical values for the "t-statistics". This means that the null hypothesis of a unit root cannot be rejected for the level of each variable. Therefore, it is concluded that the NOE, GDP, EXR, and INF are non-stationary series. However, each time series is integrated of order one; that is each series is I(1). In other words, at first difference, all the variables: non-oil exports, real gross domestic product, exchange rate, and inflation rate were stationary.

The next step involves applying Johansen co-integration procedure to check whether the variables are co-integrated or not. The Johansen co-integration tests for NOE, GDP, EXR and INF are displayed in table 3.

From the above, we fail to reject the null hypothesis of no co-integration between non-oil exports, gross domestic product, exchange rate and inflation rate at a 5% significant level. In other words, the results indicate that there is a long run relationship between these variables in Iran for the period of 1965-2010.

Conclusions and Suggestions

The purpose of this study was to test the effect of macroeconomic variables on non-oil exports using the ordinary least square (OLS) and co-integration test analysis based on the Johansen approach. Results found show positive impact of exchange rate in free market, real gross domestic product on non-oil exports. This implies that increase in these variables leads to better performance of dependent variable while a fall worsen their performance. On the other hand, the effect of inflation rate on non-oil exports has been found insignificant with unexpected positive sign.

According to the above results, it is suggested that: (i) Special economic legislation and policies, to strengthen, support and assistance to manufacturing sector and the manufacturing sector centered for all policies, programs, decisions and actions in all economic sectors, (ii) Improving the business environment and promote entrepreneurship and productivity, (iii) Cooperation of banking system in the opening credits for the purchase of raw materials, providing low-interest credit to the manufacturing sector, and making removal of difficulties on loan repayment manufacturers, (iv) Exchange rate policies can lead to maintain international competitiveness and create sustainable external balance of payments, hence, exchange rate policies should be revised and eliminate exchange rate instability. It is necessary to note that strategies are adopted to increase gross domestic product and achieve real exchange rate and also increase in investment and aggregate supply, lead to decrease in inflation rate and as a result, non-oil exports will increase.

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Table 2: Unit Root Test Result using ADF Procedure

Variable	5% critical value		Level ADF statistic		First Difference ADF test statistic		Order of integration
	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	
NOE	-2.929734	-3.515523	0.587783	-1.689923	-6.906259	-7.082605	I(1)
GDP	-2.929734	-3.515523	-1.403042	-2.802085	-3.715107	-3.692499	I(1)
EXR	-2.929734	-3.515523	-0.491064	-2.108013	-3.448192	-3.395825	I(1)
INF	-2.931404	-3.518090	-3.951317	-3.550028	-5.888335	-6.445128	I(1)

Source: Author's computation from E- views version 6

Table 3: Johansen Co-Integration Test Result

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	5% Critical Value	Prob.**
None*	0.385354	51.06727	47.85613	0.0242
At most 1	0.305034	29.65204	29.79707	0.0519
At most 2	0.212345	13.64075	15.49471	0.0933
At most 3	0.068838	3.138164	3.841466	0.0765

Trace test indicates 1 co-integrating eqn (s) at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.
** MacKinnon-Haug-Michelis (1999) p-values.

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