RELATIONSHIP BETWEEN EXPORTS AND ECONOMIC GROWTH
IN THE INDUSTRIAL SECTOR IN IRAN

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Abstract
This research surveys relationship between exports and economic growth in the industrial sector in Iran. 2010 based on the availability of data and statistical information to be discussed. Analyze the impact on the growth of industrial exports in terms of value added of industry research panel models with fixed and random effects estimates are women. Based on the research results, the hypothesis of a positive impact of increased exports on the growth of the industrial sector in Iran is to be accepted. It is suggested that in order to increase the value added of the industry as the most important part of the economy, the development of this sector should be considered.

Keywords: Economic growth, Industrial sector, Industrial exports

Introduction
Achieve the high economic growth is the major concerns among economists and politicians indifferent countries where several factors affect economic growth. Industry is one of the important and fundamental sectors of economy as well as the major infrastructure for economic growth and development so that achieve the development in industry sector is one of the ultimate objectives since the early civil plans in Iran begun. Hence, during different periods of economic planning at the macro level, the industrial sector has always received special attention. Gates of each country's economy opens its arms to sustainable economy and development when the appropriate industrial infrastructure and investments considerably start conducting, because industrial development and growth provide the infrastructure and possibility of development and growth in other economic sectors. Many economists have introduced business as growth and economic development engines. Hence, business aims to define access to economic development clearly regarding the requirements available at any state, getting assistance from prudent policies and identifying sources of the developmental production and export (Rypas and Krystvplas, 2005). Foreign trade and its relationship with economic growth is one of the most controversial issues particularly in selecting development strategies in developing countries. In general, a two-way causality, Lack of relationship, the causal relationship between export growth to GDP growth and vice versa is all the outcomes obtained from the studies conducted across the world. Given the importance of industry sector at country’s economy with respect to foreign export as the main driving for
growth and evolution of industry, this paper aims to study and analyze the impact of industrial export on growth of value added in different industries across Iran.

**Problem statement**
How to proliferate the economic growth is the leading economic issue across the world particularly at developing countries. In recent two decades, substantial changes have been occurred in economic policies and global trade. Hence, the most substantial change was universal desire of market economy and economic liberalization. One of the patterns of economic growth is the economic growth through the expansion of exports. This pattern was proposed in the early 1960s, transformed to the most important pattern of development in the 1970s and the most ideal pattern for most of developing countries whereby it is hoped being able to cope with poverty and lack of development in this way. High volume accounted for trade in industrial markets in the global economy and the value is high in a manner that 77% of the total export value associated to industrial products during 2000-2009. Industry in technical innovations and research and development to achieve economic development of every country has a special role. For instance, over 50% of financial resources within member state of the European Union are spent for research and development activities provided by industry sector. In Iran, problems caused by the monoculture economies and over-reliance on oil revenues, the economy was heavily influenced by external factors such as fluctuations in world oil prices. Diversity of export structure and harmonious development of the country's export structure with the capacity to export products could become a viable alternative to oil exports. Industrial policies not only are the main incentives for open economy and competitiveness through appropriate industrial and commercial policies, but also are effective in long-term job creation as well as the protection of natural resources through effective use of reproducible and irreproducible resources.

In general, industry sector has to receive attention as the most proper infrastructure to increase Non-oil exports because Presence in world markets is significant and justifiable more with Export of industrial goods rather than Export of raw materials. Now given that Iran faced with the biggest change, i.e. moving towards the path of development, it has to go through studying how the role and impact of industrial export is at this point.

**Research importance**
WTO has led the industry sector in different countries throughout the world places in international competitive environment, where foreign trades an engine of economic growth, has become the international economy and the national economy. This has been called upon as a process increasingly led to the presence and competition in various trade capacities. The global economy has found a new form compared to two decades ago. Investment and trade in the international arena tied and together developed a framework to the export development strategy. Today, there exist some countries all around the world which can contribute to global markets only with an outward-oriented strategy. A survey on the newly industrialized countries’ experience makes the importance of export as well as its role in proliferating the economic growth across these countries crystal clear. Export development can lead to the strengthening of foreign exchange and increasing the reproduction. On the other hand, Export growth may cause proficiency in the export production and export growth and increased production of goods appear where by levels
of productivity increase and reallocation of resources from the inefficient non-commercial sector comes to realize with higher productivity. Hence, changes in productivity lead to a big increase in production. Further, export provides foreign exchange for the country so that the conditions can be facilitated to import capital goods; consequently a big development and growth might occur in production. Export causes markets with the efficient size appear where on a substantial increase in the size and scale of economy as well as rate of capital formation and technological change emerges. Given the impact of export on economic growth, analysis of impact of export development in industry sector on value added is required to recognize the potential capacities so as to reach economic growth over measure, mentioned as the Objectives proposed for visions of twenty years.

Research objectives
This paper aims to analyze and investigate the impact of industrial export on growth of value added in different industries across Iran during 2002-2010, regarding the accessibility of data in form of econometric models and theories for economic growth. Besides the major aim of this study, this paper seeks to find out which of industrial sub-sectors influenced the most the value added in industry sector. On the other hand, recognize the type of relationship between export development and growth and capital formation as well as investment as the engine of industry, production and occupation reported as the secondary objectives.

Research hypothesis
Given the research question, the hypothesis considered in this study includes increasing industrial export affects growth of industry sector in Iran.

Research Background
Chun-Ping Chang, Aziz N. Berdiev, Chien-Chiang Lee (2013) in a study addressed investigating impact of exports of energy and globalization on economic growth in the five areas of the South Caucasus (Azerbaijan, Armenia, Georgia, Russia and Turkey). They studied impact of export on economic growth using a Panel data model during 1990-2009. The results from this study show that increasing energy exports leads to increasing economic growth in the studied countries. On the other hand, increasing energy export besides globalization leads to increasing the economic growth.

Gonzalo Hernandez Jimenez, Arslan Razmiz (2013) in a study addressed examining the relationship between export, industrial export and economic growth in Asian countries. They addressed investigating different types of export on economic growth in Asian countries in form of one of the data panel pattern. The results from this study showed that among different types of export, the industrial export affects economic growth in Asian countries the most.

Barbara Pistoresi, Alberto Rinaldi (2012) in a study entitled “export, import and development”, addressed investigating the relationship between export, import and economic growth across Italy. They investigated the relationship between industrial export and economic growth in Italy using Co integration analysis and causality testing in 1863-2004. The results from this study showed that the long-term causality between industrial export and economic growth exists, but, causality changes over the years. Zang and Baimbridge (2011) investigated the relationship between export, import and economic growth in southern Korea and Japan countries using Vector Autoregressive Models.
The results of this study indicate that there exists a long-term relationship between variables studied in a long-term in both states, where further there exist evidences from the two-way causality between import and economic development. Furthermore, it seems that Japan has experienced Export-led growth hypothesis, while South Korea's GDP growth has a negative effect on the growth of exports.

Omisakin (2009) has studied Export-led growth hypothesis in Nigeria. In this study, the relationship between economic growth and export in 1970-2006 using Annual data is examined. The results from Toda-Yamamoto non-causality test indicated that there exists a two-way causality between production and export. Furthermore, the results from Auto regressive distributed lag bounds testing indicated that there exists a long-term relationship between variables exactly while the variables vector normalize in terms of variable of production.

Ullah and et all. (2009) have studied Export-led growth hypothesis using Methods for time series in Pakistan during 1970-2008. The results from this study indicate that export development leads to economic growth. They further examined the causality between economic growth, exports, imports, gross domestic capital formation and per capita income. Granger causality test indicated that one-way causality exists between economic growth, exports, and imports.

Love and Chandra (2005) has studied Export-led growth hypothesis in the form of a Vector Autoregressive Model in Bangladesh. The results from this study indicated that the causality in short-term and long-term drives from earnings to export.

Nebulaand T. (2003) in a study examined the role of foreign trade and human capital on economic growth in 93 developed and developing countries in 1970-2000. The results from findings show that the increase in export has created a significant positive effect on economic growth whereby expansion of foreign trade increases productivity and economic growth across the countries. Miller and Upadhyay (2002) studied effects of economic openness, trade policy and human capital on total-factor productivity (TFP) using a panel data for a series of developed and developing countries. The results from findings show that economic openness has a positive significant correlation with total-factor productivity (TFP). Impact of human capital on productivity in low-income countries depends on the degree of openness of the economy, in a manner that this effect is negative for Poor countries with a low degree of openness of the economy and positive for Poor countries with a high degree of openness of the economy.

Andreas Isaksson(2002), in a study investigated the effect of interaction between human capital and foreign trade on foreign trade in 23 developing countries for the period 1960-1994. The results from the study by Isaksson indicate that there exists a positive significant relationship between human capital and economic growths in the studied countries. Yet, impact of foreign trade on foreign trade is influenced of human capital in such countries.

Tayebi et al.(2003) in a study has examined the Long-term and short-term effects of higher education on the supply of industrial exports in Iran in 1966-2009. The results from the findings indicate that, in order to achieve economic growth and the expansion of industrial exports, investment in human resources, along with other factors are required. Hence, Increase in manpower skill through training and research program can help in the development of industrial exports.
Pirasteh and Karimi (2004) in a study addressed analysis of interaction between productivity of human resources, production costs and export of industrial goods during 1994-1998. The results from findings indicate that increase in manpower productivity in the industrial sector significantly affect reducing labor costs, where this decrease has been effective in increasing industrial export. The results indicate that variables related to manpower training and skills have positive effects on increasing manpower productivity and exports of industrial goods.

**Research methodology**

Descriptive-analytic method has been used in this study. First, theoretical and issues and empirical studies were gathered using library method and then a proper analytic pattern and model regarding the considerations and requirements existing in sub-sectors of country’s industry was chosen.

At the next stage, the data collection was used and the simulation and estimation of patterns using the proper econometric methods were addressed, and finally an investigation into the research hypotheses using the statistical inferences prepared. Eventually, a variety of suggestions are proposed using the obtained results. Given different studies in the context of economic growth, a proposed pattern based on the Cobb–Douglas production function found as the best function in terms of its consistency with the economic conditions, and due to the appropriate form of this function, and accuracy of the internal relationships existing in variables.

In other words, this function, due to the homogeneity using Euler’s theorem to distribute production among production factors can be used. Further, the factor “labor” can be categorized in two groups, specialized and non-specialized labor, by means of the generalized form of this function. Cobb-Douglas production function has been used in many experimental studies of growth in developing countries. To analyze model, firstly it is necessary to collect essential data and information. To collect essential data on the theoretical issues and empirical studies, the library methods and internet have been used. Most essential data has been gathered through datasources from centerfor Statistics and the central bank of Iran. In this study, after data collection and information on export and value added as well as other necessary data provided, the relationship existing between such data is defined in clear. Thereafter, an investigation into the impact of industrial export on Value Added using econometric software and models is prepared. To model the factors influencing economic growth in sub-sectors of country, combined cross-sectional and time-series data or the very Panel Data is used.

**Statistical population**

Statistical population consists of Industry and sub-division of Iran's industry sector. Sub-division of Iran's industry sector consist of Food, Beverage and Tobacco (Code 31), Clothing and Leather industry (Code 32), Wood and wood products (Code 33), Paper and cardboard industries, printing and publishing (Code 34), Chemical industry, rubber (Code 35), industry of non-metallic and mineral products except petroleum (Code 36), Manufacturing industry of basic metals (Code 37), Machinery Industry, equipment (Code 38), and Other industries (Code 39).

**Data collection method**

To collect essential data on the theoretical issues and empirical studies, the library methods and internet have been used, where statistical resources used include statistical yearbook.
of statistical center of Iran and central bank of the Islamic Republic of Iran and statistical yearbook of Iran customs administration.

**Data analysis method**

Before the research equations estimated, firstly correlation matrix between the variables in the model to get assured of lack of linearity between variables and stability test so as to investigate the Stagnation of variables would be conducted. Thereafter, the research equations can be estimated and analyzed using proper estimators. Static Panel Data Models and estimators with fixed and random effects would be used in order to investigate the impact of export on economic growth.

Excel and Eviews 7 software would be used to analyze data. Further, Excel software is used to categorize and calculate descriptive statistics, and Eviews 7 software is used for econometric analyses and hypotheses testing.

**Presentation of the Research Model**

The pattern used to define the relationship between industrial export and economic growth in industry sector has been originated from economic growth models as well as a model by Feather (1982) which was proposed to investigate the impact of export on economic growth in two different countries which used this pattern. This pattern starts from a production function by which total product level associates to production factors.

Where \( y \), \( k \), \( L \), \( Z \), and \( A \) measures, respectively, level of total product (potential product), physical capital stock, labor, vector of factors affecting growth, productivity factor. The total differential of expression 1 is defined and the expressions are arranged in terms of Production elasticity with respect to factors of production, then we have:

\[
\frac{dy}{y} = \left[ A \frac{\partial y}{\partial K} \right] \frac{dK}{K} + \left[ A \frac{\partial y}{\partial L} \right] \frac{dL}{L} + \left[ A \frac{\partial y}{\partial Z} \right] \frac{dZ}{Z} + \frac{dA}{A}
\]

Expression 2 for an empirical measure can be written as follows:

\[
\frac{\Delta y}{y} = \alpha_0 + \alpha_1 \frac{I}{y} + \alpha_2 \frac{\Delta L}{L} + \alpha_3 \frac{\Delta Z}{Z}
\]

Where coefficients of the equation shown above are defined as follows:

\[
\alpha_0, \alpha_1, \alpha_2, \alpha_3
\]

\( \alpha_0 \) indicates technology growth, Marginal product of capital (MPC), marginal productivity of labor, product tension than other factors affecting growth. It should be noted that entering different variables to the variable shown above would not bring about any change in the main nature of pattern. In this study, to investigate the impact of industrial export on economic growth in industry sector in Iran, industrial export value has been used as the factor affecting growth. Hence, equation 3 is considered as follows:

\[
\frac{\Delta y}{y} = \alpha_0 + \alpha_1 \frac{I}{y} + \alpha_2 \frac{\Delta L}{L} + \alpha_3 \frac{\Delta EX}{EX}
\]

Where \( \Delta EX \) indicates value of industrial export in different industry sectors. To estimate, analyze and compare impact of industrial export on Value added in the industrial sector (eight selected industries), equation 5 can be written as follows:

\[
GVA_{it} = b_0 + b_1 K_{it} + b_2 GL_{it} + b_4 EX_{it}
\]
Equation shown above indicates that Value added in the industrial sector relies on productivity growth and technology, growth of capital (investment), labor force growth and growth of industrial exports.

**Explicit research modeling**

In this part, given the theoretical foundation and previous studies, the model shown below is proposed to investigate the effects of industrial export on value added in industrial sector:

\[
VA_{it} = C + \alpha_0 K_{it} + \alpha_2 L_{it} + \alpha_3 EX_{it} + U_{it}
\]

Where \(VA_{it}\) is \(i^{th}\) value added at \(t\) time interval in terms of billion Rials, mentioned as the dependant variable of model indicating the economic growth. Remained variables are the very explanatory variables of model.

**Panel-data unit-root test for stagnation of variables**

To get assured of the stability of data used in research after the research models estimated, Engle & Granger co-integration test has to be performed. Indeed, Engle & Granger co-integration test was conducted after the model estimated.

Table 1. An investigation into the non-stagnation and stagnation of research variables

<table>
<thead>
<tr>
<th>Type of regression</th>
<th>Value Added</th>
<th>Capital stock</th>
<th>Work force</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Probability</td>
<td>Statistic</td>
<td>Probability</td>
</tr>
<tr>
<td>Levine test(p-value)</td>
<td>7.84753</td>
<td>0.0000</td>
<td>-</td>
<td>6.84217</td>
</tr>
<tr>
<td>Breitung test(P-value)</td>
<td>6.08426</td>
<td>0.0000</td>
<td>-</td>
<td>3.24393</td>
</tr>
<tr>
<td>shin coordination test(p-value)</td>
<td>7.34189</td>
<td>0.0000</td>
<td>-</td>
<td>3.84664</td>
</tr>
<tr>
<td>Fisher's exact test(ADF)</td>
<td>83.8204</td>
<td>0.0000</td>
<td>51.4262</td>
<td>0.0000</td>
</tr>
<tr>
<td>Fisher's exact test(PP)</td>
<td>86.8096</td>
<td>0.0000</td>
<td>70.5360</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**An investigation into descriptive statistics of variables of model**

The entire descriptive statistics of the variables in panel model have been shown in table below. The first row of the table shown above indicates the mean of variables used in panel model. The next rows of the table shown above indicate Median, minimum and maximum observations, standard deviation and skewness and elongation of the observations used in panel model.

Table 2. Descriptive statistics of panel model

<table>
<thead>
<tr>
<th></th>
<th>Export</th>
<th>Capital stock</th>
<th>Work force</th>
<th>Value Added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2143.583</td>
<td>10083.46</td>
<td>13516.49</td>
<td>10266.40</td>
</tr>
<tr>
<td>Median</td>
<td>895.4500</td>
<td>4177.000</td>
<td>11605.00</td>
<td>7068.000</td>
</tr>
<tr>
<td>maximum</td>
<td>19023.30</td>
<td>74059.00</td>
<td>55414.00</td>
<td>43961.00</td>
</tr>
<tr>
<td>minimum</td>
<td>11.01000</td>
<td>34.00000</td>
<td>255.0000</td>
<td>443.0000</td>
</tr>
<tr>
<td>standard deviation</td>
<td>3714.583</td>
<td>15375.69</td>
<td>11592.25</td>
<td>9937.423</td>
</tr>
<tr>
<td>skewness</td>
<td>2.979447</td>
<td>2.369589</td>
<td>0.865423</td>
<td>1.428757</td>
</tr>
</tbody>
</table>
Model estimation

F-statistic is used to determine whether origin of width exists or not for each of the industries. Zero hypotheses indicate that $\alpha_i$ is fixed for all entities and OLS method can be used:

$$H_0 : \alpha_0 = \alpha_1 = ... = \alpha_n = \alpha$$
$$H_1 : \alpha_i \neq \alpha_j$$

$$F(n-1, nt-n-k) = \frac{(RSS_{UR} - RSS_R) / (n-1)}{(1 - RSS_{UR}) / (nt-n-k)}$$

Given the expression shown above, UR defines the indefinite model and sign of R indicates indefinite model with a fixed expression for the entire groups. $K$ is the number of explanatory variables considered in model, $n$ is the number of industries and $N=nt$ is the entire number of observations.

If $f$ calculated be greater than the $f$ shown in table given the freedom degree $(n-1)$ and $(nt-n-k)$, then zero hypotheses is rejected and the Constrained regression would not be found with validity so that the width of origin has to be taken into consideration. F-statistic for the economic growth model for Constrained and in-Constrained regression using Eviews 6 Trial Version-software has been shown as below.

Table 3. F-test to select panel and OLS

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Freedom degree</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.976173</td>
<td>8.69</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Since $f$-statistic with freedom degrees 8 and 69 at higher than 99% confidence level is statistically significant, $H_0$ is rejected and group effects have been accepted so that different width of origins has to be taken into consideration.

The final model and interpretation of coefficients

The final model estimated in 9 groups of industries is as follows:

$$(VAL_{31}) = 4740.531872 + 7045.000765 + 0.1154803008*(L_{31}) + 0.09094228654*(K_{31}) + 0.3468458439*(EX_{31})$$
As observed above, coefficients of Variables labor, capital, inventory and industrial exports are the same in all industries, but, the width of origin is different in each equation. Coefficient obtained for the variable industrial exports equals 0.34, mentioned at very high level statistically. This coefficient indicates that Increase in industrial exports lead to increasing economic growth in different industries during the period examined. Industrial export growth in several ways can increase the value added of the industry. For instance, Increase in industrial exports may cause an increase in proficiency at manufacturing of export products, and then cause growth and development in production of these products seen consequently productivity levels would increase and reallocation of resources would be conducted from inefficient Non-commercial sector to a sector with higher productivity. Hence, changes in productivity lead to expansion of production. On the other hand, industrial exports provide foreign exchange for the country where on conditions are facilitated for import of capital goods, contributing to growth. It can say that increase in Industrial exports, results inefficient markets and leads to economically effective costs and speeding up the rate of capital formation and Technical changes. In general, give the obtained results, it can say that exports-economic growth hypothesis in various industrial sectors during the period under study is confirmed. To justify this result, it can deduce that exports increase production and thus increase economic growth in the industrial sector, and this is in situation that expansion of production might increase export level. In other words, a two-way causality between export and economic growth might exist. Indeed, exportswilllead tomore
revenue which will ultimately lead to increased production and export which will eventually increase. Furthermore, specialization of production and economies of scale will lead to lower costs and increasing export. On the other hand, exports, increases resource productivity and thus increase the level of exports in the next period. The varied coefficient for the number of labor equals 0.11, mentioned statistically significant at 95% confidence level. Coefficient of variable “investment” has been considered as a substitute for capital inventory in the model has been considered, which equals 0.09 and statistically categorized at a high level, indicating that increasing trend of investment in different industrial sub-sectors can increase value added in these industries. Increased investment indifferent industrial sub-sectors during the period under review has increased the value-added existing in these industries. Total results on estimation indicate that about 0.98% of dependent variable is defined through independent variables. According to f-statistics (324.309) for the model, the variables measured in this model statistically are at a very high level.

Conclusion
Given the results from this study, the impact of industrial export on value-added growth of Nine Sigma industry during the period of study was positive and significant. This result is totally in consistent with the results from the other studies.

In general, given all the theories and studies existing inside and out of the country, the role of exports development in increasing GDP and prosperity of states is clear for everyone, particularly given that globalization and the tremendous developments in e-commerce and information and communication technologies have occurred. In today's world, a country can be placed on the world stage, while contributing to global markets with an outward-oriented strategy. Experience of newly industrialized countries makes the importance of exports and its role in accelerating economic growth clear, in a manner that experience of newly industrialized countries can be called upon as a miracle in the economic literature. Development of export was proposed during the country's second export development program, but the emphasis and attention was further strengthened in the third program and this leads to more successful performance of the country's foreign trade regarding the objectives of program. However, exporting Cultures somewhat has been shaped, needing to formation of more foundations and institutions to bring about changes in export and transferring traditional export to high technology-based export relevant with modern technologies is necessary. This has to receive attention in next development programs.

Suggestions
According to the results from the findings, there exists a positive significant relationship between export and economic growth, and the export-led growth has been confirmed so that it is suggested that export development receive a particular attention in order to increase value added in industrial sector as the most important sector in economy of country. Export-led development leads to strengthening foreign exchange and an increase in production. In other words, export development might cause proficiency forms in Export production, and an
increase occurs in production whereby the levels of productivity increase and reallocation of resources from the inefficient non-commercial sector comes to realize with higher productivity. Hence, changes in productivity will lead to increased production. Further, export provides foreign exchange for the country so that the conditions can be facilitated to import capital goods, consequently a big development and growth might occur in production. Export causes markets with the efficient size appear where on a substantial increase in the size and scale of economy as well as rate of capital formation and technological change emerges. Hence, it is suggested to provide necessary incentives to produce export products as well as policies such as the policy to encourage export to support the manufacturers, so as to increase export in country followed by increase of economy in industry sector and eventually economic growth and development.

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