

## The Impact of Weighted Comparative Advantage of the Nine Exports Industries and Exports Diversification on Economic Growth of Selected Developing Countries in West Asia

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**Abstract:** Developmental plans of the country emphasize on the exports-focused growth strategy and export diversification is one of the most appropriate policies in this area. Export diversification can serve as an important lever for production growth if it moves from primary goods to products with high skill and high-tech industrial goods; on the other hand, it is necessary to note that the comparative advantage in the production and export of goods is one of the effective factors in understanding the manufacturing and exports capabilities of a country to adopt appropriate policies in this field, based on the results of this research, the average impact of the weighted comparative advantage of the nine industries has been negative and significant on economic growth. Also, the effect of exports diversification has been positive and significant on economic growth of the countries studied. Overall, the findings of this research relies on the fact that these countries have had a static comparative advantage in the period under study and exports diversification have been carried out only on the industry with advantage that means the industry code 35 (oil and petrochemical industry) in the group of developing countries in West Asia. In order to increase the industrial exports to compete in the international economy and achieve higher economic growth, the countries under investigation should have a strategic sight to the physical and human capital and creation of the comparative advantage. Therefore, the present study attempts to review and evaluate the effect of comparative advantage and export diversification on the economic growth according to the selected developing countries' nine industries in West Asia by using the method of panel data for the period of 1998-2013.

**Key words:** Comparative advantage, export diversification, panel data, skill, West Asia

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### INTRODUCTION

The need for economic development in developing countries is not hidden from anyone where the huge gap between these countries and the industrialized countries is rising therefore, developing countries should put the development planning at the top of their activities.

The importance of the industry sector and its fundamental role and contribution as the most important factor in stimulating economic growth in both developed and developing countries is absolutely outstanding. So, that many economists believe that the development of the industry sector is for the benefit of other sectors of the economy, meaning that there is a close relationship between the various economic sectors and growth and development of the industry sector encourages the other sectors of the economy and increase employment, production and income in the whole economy.

So, it seems that according to Ricardo, utilization of production, based on comparative advantage can help the

development of industrial products very much and in order to create an appropriate mutation in production and export of non-oil products and also cut dependence on revenues from crude oil, first the comparative advantages of existing production and then the revival of potential advantages and other competitive factors should be considered by adopting appropriate production and export policies.

Therefore to achieve industrial development and its continuation in addition to the widespread use of traditional factors of production (labor and physical capital), attention to the country's comparative advantages in production and also increasing the production through diversification of goods production in terms of structure and number of goods is inevitable. For this purpose in this study, two discussions of comparative advantage and diversification in the industry in selected developing countries in West Asia are considered and the following two hypotheses are evaluated and tested:

- First hypothesis: comparative advantage of manufacturing industries has been ineffective on the economic growth of the developing countries in West Asia
- Second hypothesis: exports diversification has been ineffective on the economic growth of the selected developing countries in West Asia

### **THEORETICAL LITERATURE**

The transition from the era of single product economy and achieving a jump in non-oil exports in the today's world is not an easy task and requires a convergence of national economy with global transformations. Today, countries can play an active and effective role in the global trade scene that have a high competitiveness in exports of goods and services. In this context, containing a comparative advantage in exports is necessary for success.

Existence a comparative advantage in producing and exporting goods is one of the contributing factors in understanding a country's export capabilities to adopt appropriate policies in that field. Simply it is believed that countries come into foreign trade and start exchange of goods at the international level because of the existence of the comparative advantage in the production of goods.

The comparative advantage which is considered in association with international trade, means that if a country produces a good cheaper than other goods this country has a comparative advantage in the production of this good and it can benefit from the export of the good which it has comparative advantage in it by entering in the arena of global trade. The concept or principle of comparative advantage has changed greatly since its emergence. Adam Smith's theory of absolute advantage, Ricardo's theory of comparative advantage and Ohlin and Heckscher theory are the most important proposed theories in the field of comparative advantage which have investigated this field by using a traditional view.

Nowadays, the old concept of comparative advantage which is based on natural resource assets, lost its function. In contrast, knowledge and technology are the determinant of success of the industries on the world stage. Due to created transformations in information technology, new theories of international trade have emerged that the technology gap theory (Panzer theory) is one of these theories. According to this theory when a new product is produced by an innovator firm and by using a modern technology in a country, the country will be in a temporary exclusive position in the production of it. Due to the comparative advantage of the new technology, the country starts to produce and export this good to other countries.

According to this theory when in a two countries model, one country is much more dynamic than the other one, the country with less dynamism has to pay the cost of importing new products by exporting traditional goods with poorer prices and so that the country is not able to conduct massive investments required to modernizing production units, etc. in order to increase dynamism. Conversely when different countries have similar dynamism due to the fact that innovations introduced in each country are quickly imitated by the others, international trade can be motivating for overall growth.

Proponents of export development strategy believe that the developing countries should increase their exports earnings as far as possible and start to invest and consume from this earnings. But being single product is the characteristic of the developing countries and the fundamental problem about these countries is that a replacement product may be invented or developed for their product in the long term. In the short term due to the economical nature of these goods there will usually be large fluctuations in their prices because they have demand and supply with low or without elasticity. The reason of low elasticity of demand and supply is absolutely related to the uniqueness of these goods which are mostly mineral raw material, agricultural products, food and so on. The problem of reducing price and exchange rate is another important issue about the export products in developing countries (single products). A large number of economists including Prebisch (1950) believe that the exchange rate is usually changing to the detriment of developing countries constantly. This is a result from the fact that first, over the last 50 years, the rate of increase in prices of exported goods in developing countries is less than the rate of increase in the prices of their imported goods. Because the export goods of developing countries are mostly raw materials and agricultural products that are with low elasticity in supply and demand. While their import goods are the industrial countries' exports (mostly in the kind of manufactured products) which have high elasticity in demand and supply. Secondly, the price of export goods of developing countries that means raw material and agricultural products mostly have many fluctuations while the price of import goods of advanced countries which are mostly industrial products have very little fluctuations.

So, fluctuations in prices is causing fluctuations in foreign exchange revenues in developing countries and this also leads to unpleasant effects such as disruption in economic development plans of countries. Hence to deal with single-product export losses in developing countries, the export diversification issue has been raised. In recent years, export diversification in developing countries that rely mainly on single-product exports have been a priority

in policy making and this is for increasing the number of export goods and reduce the dependence on a single source of income. In the other words, the exports of a country will be more diverse if its composition and focus to be in large numbers of the export goods.

Another important point about the tendency of the countries to industrialization strategy is the issue of reducing the comparative and competitive advantage of raw materials and severe fluctuations of their prices and their relatively constant and sometimes descending trend compared to the industrial products with higher added value. This is the reason for overruling the tendency of industrial development in developing countries. Moreover, the industrial development as a driving force is also effective on the development and growth of all sectors and social contexts.

### **EMPIRICAL LITERATURE**

Gong and Zhou (2014) have studied financial development, the choice of technology and comparative advantage. In this general equilibrium model, banks and manufacturing firms engage in oligopolistic competition. A more advanced manufacturing technology has a higher fixed cost but a lower marginal cost of production. We show that manufacturing firms located in a country with a more efficient financial sector choose more advanced technologies and this country has a comparative advantage in the production of manufactured goods. Even though the foreign country has a less developed financial sector than the home country, the opening up of trade with the foreign country leads domestic manufacturing firms to adopt more advanced technologies. An increase in the level of efficiency in the financial sector of one country causes manufacturing firms in both countries to adopt more advanced technologies.

Beyene (2014) analyzed trade integration and revealed comparative advantages of Sub-Saharan Africa and Latin America and Caribbean merchandise export. In this study, examined the Revealed Comparative Advantage (RCA) of Sub-Saharan Africa (SSA) and Latin America and Caribbean (LAC) on the export of five merchandise subsectors (during 1995-2010) using the World Development Indicators database. Despite improvements observed, SSA's and LAC's trade share and economic integration are low. LAC has stronger RCA than SSA in export of food items though the gap in their competitiveness is not wide. The SSA region has higher RCA in export of agricultural raw materials, fuel and ores and metals than LAC. Both regions have revealed comparative disadvantage in the export of manufactures, though lesser in LAC.

Goddfrey Forgha study the effects of export diversification on economic growth in Cameroon. This study is designed to investigate into the nature of export diversification and the relationships between export diversification and economic growth in Cameroon. Using data from 1980-2012, the Vector Autoregressive (VAR) technique of estimation is adopted to stimulate policies necessitated by the study. In reality the study establishes that export diversification had positively and significantly affected economic growth in Cameroon within the period of study. This finding is ironical since the economy of Cameroon has timidly grown over the years. Based on the VAR results, we further recommend the expansion of the export base by acquiring new production techniques, research on new products, marketing and the provision of incentives and subsidies for private sector development. Redesigning of education curriculum to train qualified man power in the export sector of the economy. Furthermore, the government should properly manage the public debt and especially the external debt and the consistent negative balance of payments position which sucks away the benefits of external trade from Cameroon.

**Survival analysis of the exports of least developed countries:** The role of comparative advantage is studied bynicitain year 2013. The study Motivated by the standard Heckscher-Ohlin theory, he investigates whether comparative advantage affects the duration of exports from Least Developed Countries (LDCs). To do so, he first calculates each exported product's distance from the country's comparative advantage. Then, he estimates a semi-parametric Extended Cox Model with time-independent/dependent explanatory variables to measure export survival rates. He fined evidence that a product's distance to comparative advantage is a determinant of export survival for LDCs. Moreover, he fined that the influence of comparative advantage over LDC export survival increases with time. This implies that exports of products that are close to the country's comparative advantage are likely to be more durable. In the long run, comparative advantage can evolve dynamically. Export diversification by LDCs into non-traditional sectors calls for vigorous investment to improve the quantity and the quality of their factor endowments.

Thi Thu TraPhamand James Riedel have empirically analyzed the dynamisms of comparative advantages with the aid of production level data by using panel data in 10 Asian countries and 10 non-Asian countries with relatively rapid economic growth in the period of 1997-2007. This study investigates how the comparative advantage can increase the per capita income. The evidences show that in countries that production and

export diversification (and not their specialty) is higher, per capita income has increased. So, based on these results, the comparative advantage should not be proposed to developing countries as a basis for revival of industrial policies. Thus, according to the empirical results in this study, comparative advantage can provide reinterpretation for the production and exports diversification.

Rodrik discuss patterns of structural change in Africa, Asia and Latin America since 1990. He base his analysis on a panel of 38 countries with data on employment, value added (in 2000 PPP US dollars) and labor productivity (also in 2000 PPP US dollars) disaggregated into 9 economic sectors, starting in 1990 and ending in 2005. He supplemented the 10-Sector Database with data for Turkey, China and nine African countries: Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa and Zambia. Results show that since, 1990 structural change has been growth reducing in both Africa and Latin America with the most striking changes taking place in Latin America. The bulk of the difference between these countries' productivity performance and that of Asia is accounted for by differences in the pattern of structural change with labor moving from low-to high-productivity sectors in Asia but in the opposite direction in Latin America and Africa. Large gaps in labor productivity between the traditional and modern parts of the economy are a fundamental reality of developing societies. In this study, he has documented these gaps and emphasized that labor flows from low-productivity activities to high-productivity activities are a key driver of development. In this appendix, we discuss the sources and methods we followed to create our dataset.

Lu and Karpova (2011) analysis comparative advantages of the Indian and Chinese apparel industries: an analysis of the global value chain. The research investigated comparative advantages of the Indian and Chinese apparel industries by evaluating each industry's performance. The investigation employed the global value chain framework. A wide range of secondary data were used from the Indian, Chinese and international databases. The data were synthesized and analyzed at the level of each component of the global value chain: textile materials supply, manufacturing, transportation and logistics services and marketing. The study revealed that the Chinese apparel industry had comparative advantages in the following: material supply in the MMF sector; full-package production and lean/agile manufacturing and efficient transportation and logistics services. The Indian apparel industry had comparative advantages in: lower labor costs, production differentiation and

specialization, flexible manufacturing and marketing. Disadvantages in the Chinese and Indian apparel industries were also identified, respectively. Industrial upgrading opportunities and recommendations for each industry's future development were formulated. Implications for potential trends of the global apparel industry were also explored.

Szirmai (2012) investigate on Industrialization as an engine of growth in developing countries. This study examines the emergence of manufacturing in developing countries in the period 1950-2005. It presents new data on structural change in a sample of 63 developing countries and 16 advanced economies. Industrialization is seen as a single global process of structural change in which separate countries follow different paths depending on their initial conditions and moment of their entry into the industrial race. With a few important exceptions such as Mexico, Brazil, India and China, developing countries embarked on industrialization after 1945. The study argues that successful catch up in developing countries is associated with industrialization. It examines the theoretical and empirical for the thesis that industrialization acts as an engine of growth and attempts to quantify different aspects of this debate. The statistical evidence is not straight forward. Manufacturing has been important for growth in developing countries but not all expectations of the engine of growth hypothesis are borne out by the data. The more general historical evidence provides more support for the industrialization thesis.

Ferreira and Harrison (2012) has investigated the export diversification and economic growth in Costa Rica and showed that Costa Rica has gained comparative advantages in industry and factory sectors. By using self-description model with wide lags and also Granger causality test, he has concluded that despite the existence of diverse exports there is no causal relationship between export diversification and economic growth in Costa Rica in the period of 1965-2006.

Technology and demand for skilled labor in Turkish private manufacturing industries examined by Aksoy (2009). This study examines the relationship between technology and demand for skilled labor both historically and empirically. First, it is pointed out that the Industrial Revolution substituted skilled labor with unskilled labor since it has a de-skilling characteristic. Second, the skill-bias feature of Information and Communication Technologies Revolution is suggested. Finally, the effect of technological progress on the demand for skilled labor is tested for Turkish Private Manufacturing Industries. According to the static panel data estimation results there is a positive but weak relationship between technological progress and demand for skilled labor.

Naude in an article about the export diversification and specialization in South Africa for the period of 1962-2000 and by using Computable General Equilibrium Model (CGE) have concluded that the export diversification leads to increase in economic growth rate and employment.

Hesse has estimated the relationship between export diversification and growth of per capita income by using Solow growth model and dynamic panel data approach and Generalized Method of Moments (GMM) in 99 countries in the period of 1961-2000. His findings showed that in developing countries, exports focusing on a limited number of goods which has been measured by the Herfindahl index has a negative effect on gross domestic product per capita.

Liu and Zhou (2008) have investigated the effects of foreign investment, acquisition, merger of corporations and business on innovation in high-tech industries in China by using panel data analysis. Based on the results of this research, foreign research and development activities by multinational companies have considerable effect on innovation performance of domestic firms.

Mellati in an article has examined the influence of production technology and specialization of export on per capita income and economic growth in the West and the East Asian countries. In this study, 2 SLS Methods and GMM regressions have been used to estimate the specialization effect of the exports of capital goods on productivity level and growth in the period of 1988-2003. The results show that there exists the strong evidence on positive and significant relationship between higher levels of specialization of exports of capital-intensive and technology-intensive goods and high level of productivity.

Braunerhjelm and Thulin (2003) in an article have entitled which can countries create comparative advantages? R&D expenditures, high-tech exports and country size in 19 OECD countries, 1981-1999. In this study analyses how increased R&D expenditures and market size influence the distribution of comparative advantage. Previous studies report ambiguous results and also refer to periods when markets were much more segmented and production factors less mobile. The empirical analysis comprises 19 OECD-countries and spans the period 1981-1999. It is shown how an increase in R&D expenditures by one percentage point implies a three-percentage point increase in high-technology exports whereas market size fails to attain significance. In addition, institutional factors influence the dynamics of comparative advantage.

Herzer and Nowak-Lehmann (2006) by an econometric analysis have studied that what does export diversification do for growth? It is frequently suggested

that export diversification contributes to an acceleration of growth in developing countries. Horizontal export diversification into completely new export sectors may generate positive externalities on the rest of the economy as export oriented sectors gain from dynamic learning activities due to contacts with foreign purchasers and exposure to international competition.

Vertical diversification out of primary into manufactured exports is also associated with growth since primary export sectors generally do not exhibit strong spillovers. Yet there have been remarkably few empirical investigations into the link between export diversification and growth. This study attempts to examine the hypothesis that export diversification is linked to economic growth via externalities of learning-by-doing and learning-by-exporting fostered by competition in world markets. The diversification-led growth hypothesis is tested by estimating an augmented Cobb-Douglas production function on the basis of annual time series data from Chile. Based on the theory of co-integration three types of statistical methodologies are used: the Johansen Trace test, a Multivariate Error-Correction Model and the dynamic OLS procedure. Given structural changes in the Chilean economy, time series techniques considering structural breaks are applied. The estimation results suggest that export diversification plays an important role in economic growth.

Lutz (1987) has investigated shifting comparative advantage, the NICs and the developing countries. It has been suggested that there have been shifts in comparative advantage for labor-intensive manufactures from the Newly Industrializing Countries (NICs) to other developing countries, permitting these latter states to export these products to the world market. An analysis of changes in exports for selected three-digit product categories for manufactures for sixteen countries from 1968-1976 and from 1976-1982, however, indicated that such shifts have not occurred. Many of the other developing countries that have expanded such exports have done so in the same product categories as the NICs, not different ones. In other cases, export gains of some developing countries were matched by losses by other developing states.

Liu and Buck (2007) have studied the performance of innovation and international technology spillover channels on the high-tech industries in China by using panel data analysis. Based on the results of this study, learning is followed by innovation in the industry through export and import promotion. In addition, the international technology spillover and domestic efforts have constantly been important factors affecting the performance of this industry.

Mamuneas (1999) in a study entitled public investment spillovers on the high-tech industries by using a dynamic production model has investigated the short-term effects of public investment on the cost structure of six advanced industry in America. Based on the results of this study increasing investments will reduce production costs, improve productivity and enhance the production of all industries.

Feenstra (1994) has investigated the diversity of production and measuring international prices for six levels of imported goods in the United States of America during the period of 1964-1987. This study considers the import price index with a diversity of new products at the same time; so it correlates different types of imports to a function with constant substitution elasticity and after estimating the parameters it is shown that these indexes are capable of explaining part of high income elasticity for imports of America.

### SPECIFYING THE MODEL

Generally speaking, the models developed by the growth theorists mainly attempt to answer this fundamental question: What determines the large disparities in per capitaincome across countries? Despite the lack of a unifying theory there exists large number of theories that investigate the determinants of economic growth. Initially, the literature emphasizes the importance of the physical capital and human capital on process of growth but over the last two decades much of the focus has shifted to the role of technological advance as an engine of economic growth. In this context, a large number of endogenous growth theories which take their roots from Robert M. Solow influential study bring up the prominence of the same phenomenon with more formal techniques (Romer, 1990; Grossman and Helpman, 1991; Aghion and Howitt, 1990). While complete agreement is not possible, one can conclude that there is a near consensus in the literature on the view that cross-country differences in income per capita cannot be understood solely on the basis of differences in physical and human capital (Dinc, 2012). In this study, we propose a model in which there exist same natural resources in countries and technological change of production based on comparative advantage and the diversification of production and exports studied and tested in the countries.

**Introducing the model and research variables:** The main framework of the research is based on the theories by Helpman and Krugman (1985). They believe that goods diversification, regarding consumer demand and market trend, along with other factors such as physical capital are

able to have positive effects on economic growth. Also according to Ricardo's theory each country should produce the goods that have a comparative advantage for that country. Therefore, to express the concepts of diversification, comparative advantage and value added of production, specifying the function will be investigated at first.

The neoclassic function is used in order to relating the production diversification, comparative advantage and production:

$$Y_t = F_t(K_t, L_t, P_t) \quad (1)$$

Where:

$Y_t$  = Product (gross domestic product) in the period under review

$K_t$  and  $L_t$  = Inputs of capital and labor

$P_t$  = Exogenous variable. The input of  $P_t$  is the general knowledge index in the period t

This exogenous variables consists of two major components according to Lehman and Herzer studies the export diversification and comparative advantage which could be explained as follows.

When firms increase their knowledge store their production and exports will develop, so they can attend competitive international markets. Subsidiary benefits of knowledge will be seen in increasing production sectors which are as results of learning-by-exporting and learning-by-doing. Thus, this variable can be related to production and export.

If each export sector,  $S_t$ , produces general knowledge equal to  $p_t$ , the national level of production knowledge is obtained by the following equation:

$$P_t = S_t p_t$$

where,  $P_t$  is observable indirectly and it is assumed to be constant. The level of production knowledge in the economy is a function of the number of export sectors:

$$P_t = Z(S)t$$

According to Lehman and Herzer studies, the main goods have lower potential for learning-by-doing and learning-by-exporting compared to industrial goods. Accordingly, they assume the methods of production knowledge creation in the economy increase by increasing the contribution of factory productions in total exports. So, a new equation will be written for production knowledge as following:

$$P_t = Z(S_t, MX_t) \tag{2}$$

Where:

$MX_t$  = Contribution of industrial goods in total exports and the number of export sectors

$S_t$  = Considered for storing production knowledge in the economy

The second major component of this model is related to the production knowledge used in producing industrial goods. But how  $P_t$  is effective in production function by export sector? In production functions,  $P_t$  is considered as given but according to conducted studies, export diversification (increasing the export sectors and increasing the contribution of industrial goods exports in total exports) can cause increasing if only it's based on comparative advantage.

The theoretical foundations of this issue returns to economic development theory of Adam Smith and the international trade standard model of Heckscher-Ohlin-Samuelson in a neoclassic economy which express the countries should be specialized in production and export of the goods with comparative advantage to achieve economic development.

Adam Smith states that the static trade benefit comes from specialization of production based on comparative advantage and dynamisms of the production benefits can be achieved from division of labor and economies of scale. Therefore, comparative advantage as a variable affecting export diversification can be considered as a parameter affecting general knowledge.

Then, the parameter of general knowledge is expressed as following. In this equation, the Vertical Diversification Variables ( $VDIV_{it}$ ) and Revealed Comparative Advantage of the  $i$ th industry ( $RCA_{it}$ ) are used instead of  $S_t$  and  $MX_t$  in factory industries (the nine industries):

$$P_t = Z(VDIV_{it}, \Sigma RCA_{it}) \tag{3}$$

Now, by considering the presented theoretical issues and the effect of knowledge on production in the studies

conducted by Hasan (2002) the production function in the form of Cobb-Douglas production function is considered as following:

$$Y_{it} = f(L_{it}, K_{it}, RCA_{it}, VDIV_{it}) = L_{it}^\alpha K_{it}^\beta VDIV_{it}^\gamma RCA_{it}^\lambda \tag{4}$$

The following linear model is obtained by logarithm of the both side of above equation:

$$\text{Log} Y_{it} = C_{it} + \alpha \text{Log} L_{it} + \beta \text{Log} K_{it} + \gamma \text{Log} RCA_{wit} + \lambda \text{Log} VDIV_{it} \tag{5}$$

$i$  and  $t$  indices indicate each of the nine industries (Table 1) and the year respectively and the used variables are defined as following:

In this function,  $Y_{it}$  is gross domestic product,  $K_{it}$  and  $L_{it}$  are gross fixed capital formation and total labor force given by the Economically Active Population (EAP) in the economy respectively,  $VDIV_{it}$  and  $RCA_{wit}$  are vertical exports diversification and the average of weighted comparative advantage of the nine industries, respectively and affecting economic growth as explanatory variables.

**The model's variables:** Growth gross domestic production ( $Y$ ), Labor force ( $L$ ), capital ( $K$ ), comparative advantage ( $RCA$ ) and export diversification ( $VDIV$ ) are model variables that all are calculated in nine industries. According to the above definitions of the variables, the labor force and capital are calculated from the website of World Bank in the explained way. Comparative advantage and diversification variables are also calculated as follows:

**Comparative advantage:** The variable of revealed comparative advantage of the industry: that is the contribution of export goods of each country in the total exports of that country related to the contribution the country's export in total global exports.

Table 1: Classification of the nine industries

N	The nine groups' code	Sub-sector
31	Food, drink and smoking	Food and drink industries (15)+production from tobacco, tobacco (16)
32	Textile, clothing and leather industries	Textile products (17)+clothing products (18)+tanning (19)
33	Wood and its products	Production of wood and wood products (20)
34	Bookbinding and paper industries	Production of paper (21)+publishing and printing (22)
35	Chemical industries	Production of coke (23)+production of material and chemical products (24)+production of rubber products (25)
36	Non-metallic mineral industries	Production of Non-metallic mineral products (26)
37	Fundamental metal industries	Fundamental metal (27)
38	Machinery and...	Fabric metal products (28)+production of not classified machinery (29)+production of office machinery and ... (30)+production of power generation and transmission machinery (31)+production of television and radio (32)+production of medical instruments and ... (33)+production of motor vehicles and ... (34)+production of other transportation vehicles (35)+production of furniture and not classified artifacts (36)
39	Other industries (miscellaneous)	Recycling (37)

In this study, among the existing indexes, the normalized form by Balassa (1965) evolved index will be used to measure the comparative advantage which is presented by Brasili *et al.* (2000) in Eq. 5 as follows:

$$RCA_a^i = \frac{(X_a^i/X_t^i)}{(X_a^w/X_t^w)} \quad (6)$$

In this Balassa evolved index, indices i indicates the country under evaluation, indices a represents the good under investigation (production or non-production) and w and t indices represents all traded goods and all countries in the world, respectively. Therefore, the variables of Balassa evolved index can be defined as follows:

- $X_a^i$ : the value of the export of the good a (production or non-production) in the country
- $X_t^i$ : the value of the export of all exported goods of the country i
- $X_a^w$ : the value of the export of the good a in the world level
- $X_t^w$ : the value of the export of all exported goods in the world level

Therefore, Balassa evolved index calculates the contribution of export goods of each country in the total exports of that country related to the contribution the country's export in total global exports.

Regarding that all components of RCA index are positive, so the numerical value of this index varies between zero and infinity. If the numerical value of the index is greater than unity, indicating that the country i has a comparative advantage in the exports of the good a and in case it's less than one, the country doesn't have comparative advantage in the exports of that good. Also, considering the changes in this index as a trend over a period of several years, it can be concluded that whether or not the country i has comparative advantage in the exports of good a.

**The index of the average of weighted comparative advantage:** This index is calculated by using the revealed comparative advantage. So, first this comparative advantage is calculated for three industries for each year then the revealed comparative advantage of each industry group is multiplied by the contribution of industrial exports (relative to the total export industries):

$$RCA_{wt} = RCA_{it} \times (X_{it} / \Sigma X_{it}) \quad (7)$$

Where:

$RCA_{wt}$  = Weighted comparative advantage of each industry group in the year t

$RCA_{it}$  = Comparative advantage of the ith industry in the year t

$X_{it}$  = Exports of the ith industry in the year t

$\Sigma X_{it}$  = Sum of the exports of nine industry groups in the year t

So, that the sum of export contribution of the industries equals to one and finally the average of the weighted comparative advantage is obtained which is the sum of comparative advantages of three industry groups divided by the sum of export contribution of the industries (one):

$$RCAW_{it} = \Sigma RCA_{wt} / 1 = \Sigma RCA_{wt} \quad (8)$$

$RCAW_{it}$  is the average of weighted comparative advantage of the industries in the year t.

**Export diversification (Vertical Export Diversification (VDIV)):** It shows structural change in the growth process. It means the production of the country will changes from traditional goods to industrial goods which can be measured by increasing the contribution of industrial exports in total exports. This index was used in researches by Osakwe (2007):

$$VDIV = \frac{(TMX)}{(TX)} \quad (9)$$

Where:

VDIV = Vertical export diversification

TMX = Value of total manufacturing exports

TX = Value of total exports

The closer this index to one indicates that the combination of the country's exports is focused on the more numbers of goods and so diversification will be more.

**Tools, method and data:** In this study, the annual data of macroeconomic variables of selected developing countries in West Asia (Y, K, L, RCA, VDIV) in estimation of equation Y in the period of 1998-2013.

Selected countries in West Asia are single-product countries that are dependent on the production and exports of raw materials, especially crude oil. These countries are Iran, Saudi Arabia, Oman, Syria, Kuwait and Jordan.

Statistical population consisted of manufacturing industries of the countries. In the third edition of the good classification based on ISIC code, industries have been divided into 23 industry groups according to the two-digit ISIC codes. Considering this change, the necessary



calculations for the variables in the model have been performed by using Excel Software and the model has been estimated.

Data collection method is documental and the data have been collected from the website of UN Comtrade, Unido and the World Bank in the form of librarian. Panel data technique has been used to analyze the hypothesis and information analysis and model estimation also carried out by the software of Stata.

**Model estimation and analysis of the results:** Before presenting the results of the estimated model, the weighted revealed comparative advantage of the nine export industries are studied in countries of West Asia.

By using the statistics of industries' exports in selected developing countries in West Asia, according to the two-digit ISIC codes during the period of 1998-2013, weighted revealed comparative advantage index and then symmetric weighted revealed comparative advantage index have been calculated for the nine groups industry and these indexes have been used to identify the comparative advantage. Based on this index and the comparative advantages obtained for each country, industries' prioritizing based on the comparative advantage is analyzed with the aid of the diagram related to each country.

Observing the trend of weighted comparative advantage in the exports of the nine industries of 6 developing countries in West Asia which have common characteristics with each other, indicates the interesting result that these countries have had a high comparative advantage in the industries exports in the studied period (excluding Iran from 2007 onwards and Syria from 2009 onwards) (Fig. 1).

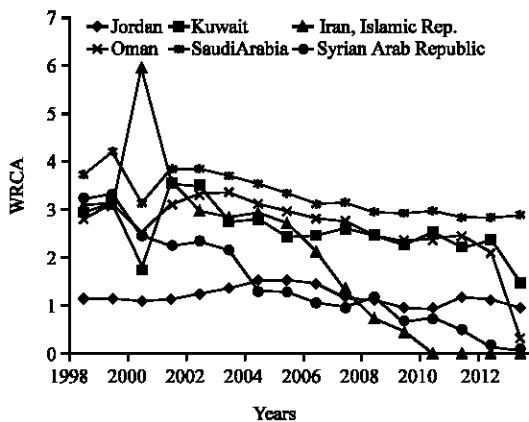


Fig. 1: Trend of weighted comparative advantage of the nine industries of selected developing countries in West Asia

The reason of this fact is the comparative advantage of these countries in the exports of oil derivatives which has ISIC code of 35 (The chemical and coal industry, rubber and plastics excluding oil and gas). Saudi Arabia has had the highest weighted comparative advantage in the export of these nine groups of industry. The development of this sector in Saudi Arabia causes income diversification and high comparative advantage in terms of cost and creating appropriate conditions and ground for the implementation of development projects and increasing production capacity in this country. According to this analysis, during the years 2009-2011 the petrochemical industry of Saudi Arabia, spent the difficult conditions affected by the global economic downturn and it was met with a severe decline in sales which has affected the country's comparative advantage. After Saudi Arabia, Oman and Kuwait have the most weighted comparative advantage in the nine export industries which has been decreased in both countries at the final years of the study period. The high comparative advantage of these two countries is in the production and exports of ISIC classification code 35. Kuwait is the largest exporter of crude oil and therefore has the advantage in the exports of oil derivatives and petrochemical industries. Although, the cost of oil production in Oman, geographically and in terms of geological composition is the highest production cost in the region but the comparative advantage of this industry in petrochemical industries is even higher than Kuwait which increase the weighted comparative advantage of the nine industries. The comparative advantage of the nine industries in Syria and Iran have moved in line with each other. In 1998, the two countries had high comparative advantage (>3) like Saudi Arabia. The trend of the weighted comparative advantage in both countries was decreasing until years 2007 and 2008 and after these years, they have the comparative disadvantage in the exports of these industries.

Decrease in exports of oil and oil products in Iran was because of various factors such as Iran oil sanctions, prevention of insurance of Iranian oil tankers, Iranian banks' sanctions which prevents the customer to pay oil money that has been purchased and in Syria because of the existence of domestic crisis and political sanctions, export of oil and oil products has been decreased.

**The estimation of economic model:** In this study by using the statistic data of the years 1998-2013, the proposed economic models will estimate by the method of panel data. Then, the results of the assessment will be evaluated and analyzed.

Table 2: The results of diagnostic tests in the pattern of gross domestic product in countries of West Asia

Country tests	Statistics	Countries in West Asia	
		Statistics	Prob.
Limer test	F	196.450	0.0000
Hausman test	$\chi^2$	317.690	0.0001
Wald test	$\chi^2$	75.290	0.0000
Test for groupwise heteroskedasticity	$\chi^2$	112.680	0.0000
First order autocorrelation test	F	31.314	0.0025
Test of cross sectional independence	$\chi^2$	18.954	0.2158

Initially, the following diagnostic tests are used to determine the appropriate method for estimating this economic model. The results of these tests are shown in Table 2:

- The test of the model estimation capability by using panel data
- The test of fixed effects or random effects determination
- Wald test
- The test cross-sectional independence
- Heteroskedasticity test
- Autocorrelation test
- Estimation of the parameters

Considering the results of diagnostic tests, the model is panel data and according to the Hausman test, using the method of random effects is more efficient. Also, the model consists of heteroscedasticity and the first order autocorrelation and there is no correlation between the cross-sections in this case, the best estimation approach is the cluster method (Hoechle, 2007).

**The reliability diagnostics test of the data:** Before estimating the model, the time series stationarity issue of model's variables is investigated. Like time series models there exists the problem of spurious regression for the panel data models too. Therefore, the implications of convergence unit root tests in panel data models is necessary to ensure the accuracy and reliability of the results and unit root test is required for each dependent and independent variables and the residual term of the model in order to ensure the existence of the convergence. In this study, LLC test (Levin, Lin and Chu) will use to investigate the unit root of panel data. The null hypothesis of the test, states the non-stationarity of the variables. The summary of the results of the unit root tests of the studied variables are presented in Table 3. According to the table, it can be seen that all the coefficients of the variables used in the equation are at stationary level.

Therefore, considering the stationarity of the variables of the model and the results of diagnostic tests,

Table 3: The results of Unit Root test of panel data for the variables under study

Country variables	Countries in West Asia	
	Statistic	Probability
LGDP	-2.3149	0.0100
LK	-6.2461	0.0000
LL	-3.6917	0.0001
LVDIV	-1.6048	0.0500
LRCA	-1.8686	0.0300

Table 4: The results of the estimation of GDP growth model in the countries in West Asia

Country Variables	Countries in West Asia			
	Coef.	SE	z	Prob.
c	13.5502	1.1104380	12.20	0.000
lnK	0.1198254	0.0239333	5.01	0.000
lnL	0.6273837	0.0746314	8.41	0.000
lnVDIV	1.296876	0.2839525	4.57	0.000
lnRCA	-0.6508488	0.1408957	-4.62	0.000
R <sup>2</sup>	0.73	-	-	-
F	135.46	-	-	0.000

the economic model GDP growth for the period of 1998-2013 for selected countries in West Asia is estimated by using the cluster method. The results of the model estimation are presented in Table 4.

The results of estimating the economic growth model and the signs of the parameters (excluding the weighted comparative advantage of the industries) are consistent with theoretical expectations and variables' coefficients are quite significant. The variables of labor and capital as traditional factors affecting economic growth have a positive and significant impact on economic growth. The coefficient of labor is 6.0. Due to the existence of the abundant labor force in developing countries and the comparative advantage of cheap labor in these countries this variable causes to increasing gross domestic product and economic growth. On the other hand, regarding that there has been not structural change in developing countries' production and agricultural and labor-intense industries sector are still thriving and the governments also support these sectors and the share of the labor force employed in the gross domestic product has been increased during the years under study therefore, gross domestic product growth is not unexpected.

Variable coefficient of capital in developing countries in West Asia was 0.1 and lower than the effectiveness coefficient of the labor. This is because of reducing savings and consequently decreasing investment. Considering the rising oil prices and increasing national income in this period in these countries, the consumption contribution of gross domestic product increases and the share of savings decreases and consequently, the gross fixed capital formation which indicates gross savings is reduced and leads to decreasing investments in these countries. Based on the consumption theory in

macroeconomics with increased income, demand for food and clothing decreases and demand for durable consumption goods, entertainment and luxury goods grows faster than income which also reduces savings and investment in the communities. Also regarding the average of the industrialization index in these countries is low, according to a study of Laitner, the average propensity to save is low too.

Exports diversification leads to structural changes in the economy. According to Syrquin (1986), exports diversification defines as changes in the structure of production and exports from primary commodities to industrial goods. In selected developing countries in West Asia, the effect of this variable on economic growth was significant and it had the most significant positive impact on gross domestic product and economic growth. This result is consistent with the theoretical foundations. This is because of the high dependence of these economies on oil. So that by rising the oil prices in world markets these countries' economic growth increases and followed by that the share of oil products increases in the country's export basket and consequently exports diversification index increases only dependent in the industry group of oil products and its derivatives (code 35). This causes instability of the domestic economy of these countries. By increasing the export contribution of other groups of goods these countries can reduce the dependence of their economies on oil and seek more economic stability and sustainable growth.

Investigating the variable of weighted average of comparative advantage of the nine exporting industries for the oil exporting countries in West Asia shows that in the industrial sector this variable had a negative and significant impact on gross domestic product of these countries which will have an adverse and negative effect on economic growth of these countries. The negative effect of weighted comparative advantage of the nine industries in developing countries can be justified as in this period these countries have been faced with rising oil prices which has caused that they focus on only the industry in which they have a comparative advantage (petrochemical industry and the industries of oil derivatives with code 35 in the classification of ISIC) and in order to change the comparative advantage of producing other industries (such as the newly industrialized countries) either have not applied or don't have the required technology which will have a negative impact on gross domestic product and economic growth in these countries. Today economic growth and development of countries is measured with industrial progress degree, so changes in comparative advantage from the agriculture sectors and the production low

productivity and technology to high technology production sectors can be an ideal target in developing countries.

## **CONCLUSION**

In this research, the selected oil exporting and developing countries in West Asia (Iran, Jordan, Kuwait, Oman, Saudi Arabia and Syria) have been considered as the context of the study and first the trends in changing the structure of production and trade (export diversification) and the comparative advantage of industries in these countries have been analyzed and then their economic growth model has been tested.

Considering the calculated weighted revealed comparative advantage of the nine export industries in the group of selected countries in West Asia in the coordinated system of classification of goods ISIC with two-digit codes, during the years of 2013-1998, developing countries in West Asia only have revealed comparative advantage in the industry code 35 (chemical and coal industry, rubber and plastics, excluding oil and gasoline) which is also because these countries are rich in natural resource of oil and can produce and supply oil and oil derivatives with low costs according to the theory of comparative advantage. During the period under investigation, export diversification of the industries in these countries were not so much, except for the industry code 35 which is also due to the existence of comparative advantage in this industry in the selected oil and oil derivatives exporting countries and only Syria has a comparative advantage in code 32 which is the textile, clothing and leather industry. Therefore, the results of the investigation show that the developing countries in West Asia due to abundant natural resources, especially oil were not taken effective steps to change the structure of production and diversification in these countries is based on their comparative advantage in natural resources and diversification has been done in the production of the oil related industries which means petrochemical industries. Thus, it can be said that the comparative advantage of countries in West Asia has been static.

Comparative advantage industries, the model of economic growth and panel data approach in the group the countries of West Asia and econometrics software STATA have been used to provide empirical evidence based on the effectiveness of export diversification and weighted average of comparative advantage of the industries on gross domestic product and increasing the economic growth in selected countries and the effectiveness of changing the structure of production and exports (exports diversification). In this model, the

variable of the average of weighted revealed comparative advantage has been used in the group of the nine industries which provides very different results compared to the simple average of comparative advantage. The results of economic model in this study which tests the effect of weighted comparative advantage and exports diversification on the production, show that the variable of exports diversification, alongside the traditional factors determining economic growth have a positive and significant impact on economic growth. Due to the high dependence of these economies on oil and oil revenues, the tendency of crude oil export and expanding the production and exports of its derivatives was increased and consequently, the contribution of this group of industries compared to total exports and industrial exports rises. Therefore, the contribution of exports diversification of other industries in these countries is very low while the exports contribution of the oil derivative industries has increased and had a significant impact on increasing gross domestic product. This variable appears with an expected sign which is consistent with theoretical foundations. So, these countries have comparative advantage in oil products and industries. By rising oil price in world markets, the economic growth of these countries increases too and consequently, the contribution of oil products will rise in their exports basket and it is clear that weighted comparative advantage of this industry cannot have a positive impact on economic growth of these countries. Therefore, the effect of the variable of average of weighted comparative advantage on economic growth is negative in the countries of West Asia.

In this way, the first hypothesis of this study is accepted which is based on the fact that the comparative advantage of manufacturing industries is ineffective on the economic growth of the developing countries in West Asia. Because in this period, these countries faced with rising oil prices which has caused they only focus on the industry in which they have a comparative advantage (petrochemical industry and oil derivatives industries with code 35 in the ISIC classification) and do not have a movement towards changing comparative advantage in the production of other industries (such as the newly industrialized countries). On the other hand, these countries do not have the required technology to produce industrial goods which has a negative effect on gross domestic product and economic growth in the country and second hypothesis of the article will be rejected which is based on the fact that the exports diversification is ineffective on the economic growth of the developing countries in West Asia. Because of the oil revenues and the tendency to crude oil exports and to expand the

production and export of oil derivatives in these countries this variable has appeared with the expected sign and it's consistent with theoretical foundations and empirical evidences.

### **SUGGESTIONS**

So, by using the results of this study, the following suggestions are offered: considering the positive effect of exports diversification on the production growth in these countries and the argument that the diversity of the composition of countries' exports which means transfer of the composition of the country's exports from primary commodities to industrial commodities may have a greater role in creating economic stability it is suggested that instead of exporting raw materials and crude oil, the production and export of industrial compounds can be considered and these countries should be diligent in upgrading the required technology in order to diversify the production and to export of this group of industries where they have a comparative advantage.

Preserving and developing the comparative advantage in the industry with comparative advantage in oil-rich developing countries (code 35 oil and oil derivatives industries) which increase production and income country is recommended to the country authorities (including Iran).

Production of industrial goods requires the use of imported capital equipment and spare parts and these factors may have suffered by the periodic shortages and consequently, the fluctuations in the level of industrial production and exports. Resolving this factor has an important role in the export development of the industry. Therefore, it is recommended that for more investment in the country and resolving this problem, countries pay more attention and effort to create incentives for savings and use it to invest.

It is suggested that the main reason for not using the production capacities in West Asia, arises from the shortage of skills and expertise, especially at the management level and also low level of labor productivity.

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