



## The Contribution of Industry and Agriculture Exports to Economic Growth: The Case of Developing Countries

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### ABSTRACT

This paper provides an empirical approach to analyze the contributions of industry and agriculture exports and its impact on economic growth in developing countries. Historically, manufacturing has acted as an engine of economic growth. On the other hand, According to economists, agricultural sector offers two main functions: first, agriculture plays an important role as the most important source of resources for the development of industry and other non-agricultural sectors. Second, agriculture is substantial market for industrial products that helps modernize traditional production techniques by providing modern inputs, technology, and improve managerial skills. We examine the role of manufacturing and agriculture as a driver of growth in developing countries in the period 1970–2014. Using a panel data approach for 34 developing countries, the study finds that the linkage between industry exports and economic growth is positive and significant but the one for the agriculture and economic growth is weak. Also government final consumption and gross fixed capital formation have significant relation with economic growth.

**Keywords:** agriculture; manufacturing; economic growth; government final consumption; fixed capital formation; panel data

## **1. INTRODUCTION**

Since all countries have experienced population growth over time, stable GDP growth necessary to maintain the current standard of living has been the most important challenge for developing countries (Kundu, 2013). One way to achieve such growth is trade with foreign countries. History of trade between countries reaches to the past, when Adam Smith introduced the trade as an engine of economic growth (Kilavu and Topco 2012, Zahir Faridi 2012). Economic theory and empirical observations suggests that, expansion in exports would increase economic growth and lead to high growth in national income. In addition, these observations suggest that the contribution of exports to the growth in gross domestic product (GDP) has been significant. Description for this observation was submitted by several prominent economists in which the beneficial aspects of the export such as increased capacity utilization, economies of scale, incentives to improve technology, budget augmentation, a low probability in market failure, asymmetric information and efficient management against the pressures of international competition is emphasized (Shuai Shao and Yang, 2014, Kim and Gopinath, 2009).

On the other hand, many developing countries are heavily dependent on Primary products as their main source of export revenues such as agricultural exports. (Mehara and Baghbanpour, 2015, Ma Fengand et al, 2014). In many developing countries, the agricultural sector plays a major role in the economy such as including food production, supply of raw materials for industries, environmental protection, development of the rural non-farm sector, maintenance of macroeconomic stability through stable food pricing and food security. Also Agriculture section play an important role in GDP growth and the main source of employment in these countries. (Ershad Ali, Talukder Dayal, 2010).

However, despite the important role of agriculture in the economy, this sector in many developing countries has been neglected. Albeit use of agricultural exports in order to achieve economic growth is not sufficient and most economists suggest, exports of industrial goods to achieve sustainable economic growth. According to Fosu (1996), is that primary exports are usually raw and unprocessed while manufactured goods are more technologically intensive, and more likely to create positive spillovers. Moreover, the process of primary commodities production shorter than process of manufacturing goods production. Therefore, learning by doing, in the production of industrial commodities higher and export of such goods will leads economic growth. (Sheridan Brandon, 2014).

Balassa (1985) asserts that, production of export goods made in sectors of the economy in which more efficient than other sectors. Therefore, expansion exports contribute to concentrate investment in this sector that lead to enhance productivity factors of production. (Ghazi and Al-Abdulrazag, 2015). In this paper we investigate the cause of the issue and ultimately, we will estimate contribution of industry and agriculture exports and its impact on economic growth for the developing countries by using panel data for developing countries over period of 1980 to 2014. The first part of the article offers a theoretical framework. The starting premise is that there is a direct relationship between the share of industry and agriculture of export to economic growth. The second part of the article, offers the model and estimate the relationship between share of industry and agriculture of export and economic growth. Finally, we will provide a summary and conclusion.

## **2. THEORETICAL FRAMEWORK**

As mentioned in the introduction, many economists such as Adam Smith and David Ricardo argued that trade acts as an "engine of growth". The majority of developing countries in East Asia and South America used the policy of import substitution to rid their dependence on imports, but none of these countries could not achieve great success and instead of reducing dependence, their dependence was increased. After failure the import substitution policy, export promotion policies were used by developing countries and since the application of this policy required openness, countries had enjoyed a lot of benefit. (Richard Cheung Lam, 2013). Countries can experience economic growth with exports of goods through returns of scale, increase efficiency by increased competitiveness at international level and specialization. (Atrkar Roshan, 2007). A large literature can be found about the role of exports in economic growth that is known to "export led growth" hypothesis. (Saad, 2012, Mangir, 2012, Amit, 2010, Love and Chandra, 2005). Indeed the main objective of this policy is to increase economic growth and proponents of this theory believes that exports expansion through enhance productivity of production factors lead to economic growth (Ran Koh, Mah, 2013, Ghazi, Bashier, 2015), as far as countries use some policies for their export promotion such as Export Bonus Schemes, Exchange retention Scheme, multiple exchange rate system, Duty draw back system and so on. (Kamijani, Mirjalili, 2006). On the other hand, openness of the economy is a necessary prerequisite for exports. Economic growth via economic openness occurs through two channels: The first channel is the classical theory of Ricardo, where the two countries through trade and by the law of comparative advantage and specialization, experiencing economic growth. Other channel is through Spillover effects such as economy of scale, knowledge and technology, increased competition that economic growth will increased. (Zelalem, 2010, Jim, 2011).

Agricultural sector one of the sectors is that used in developing countries for exports. Revenues from exports of agricultural products can reduce restrictions on foreign exchange, imports of capital goods and intermediate facilitate. Moreover agriculture have some benefits such as including food production, supply of raw materials for industries, environmental protection, development of the rural non-farm sector, maintenance of macroeconomic stability through stable food pricing, main source of employment and food security. But one of the characteristics of developing countries is that the efficiency of agricultural production in these countries is low. In addition, Historical trends show that despite the increase in demand for agricultural products, the growth rate of the agricultural sector in the world has been declining. According to some research, one of the reasons for low productivity in the agricultural sector is that agriculture still in the subsistent stage. Most of the output consumed by farmer's family, agricultural output and productivity are low due to the utilization of traditional methods and tools, Farmers' unwillingness to adopt new technology due to the lack of capital, higher energy prices, food crisis issues and sustainable development issues. (Matahir, Tuyon, 2013, Mayawala, 2008).

About the role of agriculture in economic growth, there are almost two extreme views. First view argues that agriculture plays only a passive role as the most important source of resources (food, fiber, and raw material) for the development of industry and other non-agricultural sectors. This view suggests that agricultural in order to increase total national output provide Production inputs (labor, capital and raw materials) to industrial sector and since the efficiency and modernize the industrial sector more than the agricultural sector,

therefore resources will be transferred from agriculture to other sectors (forward linkage effects). This idea was largely excited in the context of dualistic models. In traditional analysis of agriculture-industry linkage, the agricultural performance is considered exogenous (For example, the agricultural sector needs to rain, and rain is exogenous) and industrial sector as endogenous intended.

The most recent view maintains the forward linkage effects of agriculture but also emphasize its backward linkage to other sectors of the economy. Agriculture not only provides resources to nonagricultural sectors, but also agriculture is substantial market for industrial products that helps modernize traditional production techniques by providing modern inputs, technology, and improve managerial skills. Eventually though both the agricultural and industry benefit from each other but thereby increases productivity in the whole economy. (Eddine Chebbi, 2010).

According to economic theory in the long-run, however, during the economic growth, agricultural sector will shrink. Three factors for explain the decline of the agricultural sector have been provided: change in the terms of trade (or relative price) of agricultural products; differential sectoral technical change and factor productivity growth rates; change in factor endowment, i.e., of capital and land intensity (per unit of labor). (Esposti, 2014). On the other hand, the model of Matsuyama (1992) because of two factors, namely learning by doing and low elasticity of agricultural products in the smaller economies, this positive relationship between agriculture and economic growth Collapses. What this model shows, productivity of agriculture in the economy are created two effects: First there is a static comparative advantage effect, in that the agricultural sector would attract additional units of labor because of its higher productivity level. The factor inputs employed in the manufacturing sector are reduced immediately, which reduces the learning-by-doing affect and hereby economic growth. Second there is a income generation effect, in that higher agricultural productivity raises agricultural output, which increases tax revenues and public spending on infrastructures, that in turn, increase the learning-by-doing effect and economic growth. (Chang, Chen, Hsu, 2006). Most of the primary products and agricultural products have high price fluctuations. Because the elasticity of demand and supply of agricultural products is relatively low and since most developing countries are importer of industrial products and exporters of primary products, they will be losses. As a result, fluctuations in the prices of export lead to disturbance in imports of capital goods and consequently economic growth will be slower. (Azarbaijani, Raki, 2001, Abrishami, Mohseni, 2002).

Therefore according to mentioned discussion above, agricultural exports in order to achieve economic growth is not sufficient (However, in the above about benefit of the agricultural sector was mentioned). Strategy exports of industrial goods, considered as a strategy for the industrialization of the economy. Since this strategy is an outward-oriented strategy in that production of industrial goods not only for domestic consumption but rather also are considered supply of these commodities in the international markets. Moreover researchers like Wood and Berge (1997) believe that the Growth in exports of manufactured goods compared to export primary commodity is dependent on the skills of human resources. Therefore, factors such as research and development (R & D) and higher education can contribute to improving the quality of production inputs, natural resource development and technology in the export supply. (Pour Ebadollahan, (2012), Tayebi, Arbabiyan (2003), M.C. Allen, Allen, 2015).

Economic development is a process of structural changes in which the export of raw materials towards the export of industrial goods. Countries have to produce industrial goods to pan industrialization and experience high economic growth. Because developing countries produce their natural resources. (Khodayi, Darabi, 2014, Olasode, Femi, 2013). For export of industrial goods, openness of the economy, limiting government intervention rapid integration in global markets (Such as entry and exit foreign capital, borrowing from international banks and so on) in the economy is necessary. (Naderi, Akhavi, 2012, Mardaneh, 2012). Finally, it should be noted that, the industrial sector provides many benefits for the economy such as: Efficiency in Management, innovation and increased production in non-exporting sectors, increasing returns to scale, Increase revenue and production in the export sector, increasing the productivity of factors of production, knowledge spillover and etc. The marginal factor productivity in export-oriented industries are significantly higher than non-export-oriented industries. It seems that this difference partly due to externality effects related interests in the development of export-oriented industries.

### **3. BACKGROUND RESEARCH**

Bishak and Ashkan (2014), examined the effects of industrial exports on economic growth over period of 1975-2010 for Iran economy. The results showed a significant positive correlation between industrial exports and economic growth in Iran and in order to increase revenue and improve efficiency and guarantee the GDP growth, policy makers can be used export industrial goods. Szirmai and Verspagen (2015), investigated Affect industrial production on growth of 88 developing countries. They found interesting interaction effects of manufacturing with education, income gaps and a moderate positive impact of manufacturing on growth. In a comparison of the sub periods that since 1990, manufacturing is becoming a more difficult route to growth than before.

Medyawati and et al (2011), by using VAR model, examined the impact of banking development, agriculture and industry on economic growth in Indonesia and concluded that all three variable; banking development, agriculture and industry have a positive effect on economic growth in Indonesia. The variable development bank impact on economic growth was lower than the industrial sector and agricultural. Ghosh (2014), examined the impact of economic reforms on productivity of industrial production for the Indian economy by using multivariate estimation method during the period 1981-2004. He could not conclude that industrial productivity has not been a significant change after economic reforms in India. His suggest that trade liberalization and bank credit has played an important role in productivity and industrial production. Kim and et al (2009), have investigated the impact of exports on increase productivity for Korean economy, by using panel data for 1335 firms from eight different industries over the 1997-2003. They conclude that only one industry exports has increased productivity. Emami and Adibpour (2011), examined the impact of industrial export growth in the industrial sector of Iran by using vector error correction and Johansson testing over the period 1959-2007. They concluded the export industries goods and the growth of the industrial sector in Iran, there are two long-term relationship that the growth of industrial sector be affected by factors such as capital and labor and industrial export growth through external effects of exports non-export sectors.

Budhedeo (2012), attempted to empirically examine the growth-saving relationship in India for determining the causal linkages between the two using annual data for over sixty years of the planned economic era. In his study, Budhedeo examined the causal relationship between growth rate of saving and economic growth rate using the unit root test and Wald's F statistic for Granger causality testing. The empirical results revealed that there is absence of any causal relationship between saving growth rates and economic growth rates in either direction for India and hence the two variables are independent of each other.

Zahir Faridi (2012), examined the contribution of agricultural exports to economic growth in Pakistan by estimated the relationship between gross domestic product (GDP) and agricultural and non-agricultural exports for Pakistan by employing Johansen co-integration technique for the period of 1972 – 2008. He concluded that the agricultural exports have negative on economic growth while agricultural exports elasticity have been 0.58. Moreover there is bidirectional causality in agricultural exports and real GDP. Matahir and Tuyon (2013), investigated the dynamic synergies between agriculture sector and economic growth in Malaysia throughout historical economic policy adjustments spanning from 1970 to 2010.

They employed Johansen Juselius (1990), cointegration test showed that agriculture and economic growth be moving together in the long run. Moreover, they examined the direction of causality between agriculture output and economic growth within the vector error-correction model (VECM) and concluded that both agriculture and economic growth have no causality direction at least in the short run but there exist a bi-directional causality movement in the long run. From this empirical testing and policy analysis, they suggest that policy makers should pay attention to the holistic and sustainable development of agriculture sector into their policy modelling in promoting sustainable economic growth.

Amiri and Gerdtham (2011) have investigates the linear and nonlinear Granger causality between exports, imports and economic growth in France over the period 1961\_2006 using geostatistical models. For testing the Granger causality in this study two methods have been applied (VEC and Improved-VEC with using geostatistical methods). Results from these two methods are same; both show the existence of long run unidirectional causality from exports and imports to economic growth. But in IVEC there are some different forms instead of linear (which is used in ordinary VEC) in Engle and Granger structures. It says that, the results of this improved-VEC are more exact and supportive than ordinary linear VEC method.

Rahmaddi and Ichinashi (2011) examined the export and economic growth nexus in Indonesia during the period of 1971 to 2008. They investigated such relationship in a time series framework using a vector autoregressive (VAR) model. Based on findings of causality analysis conducted in VECM system, this paper has concluded that exports and economic growth exhibits bi-directional causal structure, which is ELG in long-run and GLE in short-run. In addition it has found no supporting evidence of positive causality from intermediate imports to GDP per capita.

#### **4. DATA AND METHODS**

We construct our own dataset of variables for the period of 1970-2014 as follows. The World Bank World Development Indicators (WDI) contains information about major variables: economic growth, agriculture export, manufacturing export, general government

final consumption and gross fixed capital formation. All variables are taken as a percentage of GDP, except agricultural and industrial exports considered as a percentage of exports of goods. We estimate panel regression models. The main dependent variable is growth of GDP per capita (GR) and the explanatory variables are the manufacturing export (ME) and agriculture export (AG) to merchandise exports, government final consumption (GC) and gross fixed capital formation (GFC) over GDP. This yields the following model:

$$GR = C + \alpha AG + \beta MAN + \gamma GC + \lambda GFC \tag{1}$$

The Greek symbols are parameters that we will estimate later.

The implications of unit root in macroeconomic data are, at least potentially, profound. A time-series process like X is said to be covariance stationary (or weakly stationary) if its mean and variance are constant and independent of time and the covariance's given (by  $cov(X_t - X_{t-1}) = \eta_s$ ) depend only upon the distance between the two time periods, but not the time periods per se. In order to check the time-series for stationarity one can use unit root test. Here we use Hadri panel unit root test. The Hadri panel unit root test has a null hypothesis of no unit root in any of the series in the panel and the test is based on the residuals from the individual OLS regressions of  $y_{it}$  on a constant, or on a constant and a trend. For example, if we include both the constant and a trend, we derive estimates from:

$$y_{it} = \delta_i + \eta_i t + \epsilon_{it} \tag{2}$$

Given the residuals  $\epsilon_{it}$  from the individual regressions, we form the LM statistic:

$$LM_i = \frac{1}{N} (\sum_{i=1}^N (\sum_t S_i(t^2)/t^2)/f_0) \tag{3}$$

where  $S_i(t)$  are the cumulative sums of the residuals and  $f_0$  is the average of the individual estimators of the residual spectrum at frequency zero. Finally, the unit root test results are shown in Table 1.

**Table 1.** Hadri panel unit root test results for the variables.

Variable	t-statistic	Prob
GR	2.49545	0.0063
AG	14.3866	0.0000
MAN	18.5108	0.0000
GC	1.78692	0.0370
GFC	0.43560	0.3316

Results of above tables show that the variables are non-stationary (Excluding variable GC and GFC). Because the p-value obtained is less than 0.05, the null hypothesis is rejected. Variables become stationary by first (or two) differenced. With differencing non-stationary variables the results are shown in Table 2.

**Table 2.** Hadri panel unit root test results after differencing the variables.

Variable	t-statistic	Prob
GR	-1.12371	0.8694
AG	1.22568	0.1102
MAN	0.45317	0.3252
GC	1.78692	0.0370
GFC	0.43560	0.3316

As can be seen, all variables are stationary, because amount of P-value is more than 0.05. Now we start by estimating the model of Eq. (1), the results of which are as follows:

**Table 3.** Results estimates for the variables of interest.

Variable	Coefficient	Std.error	t-statistic	Prob
AG	0.013408	0.007694	1.742657	0.0816
MAN	0.023097	0.002296	10.05951	0.0000
GC	0.052087	0.010835	4.807429	0.0000
GFC	0.142483	0.006673	21.35151	0.0000

Given the amount of risk that is less than 0.05, all variables (except AG) have significant and positive influence on economic growth. An increase of 1 percent in manufacturing export (ME), government final consumption (GC) and gross fixed capital formation (GFC) respectively leads to 0.2, 1 and 0.6 percent increase in economic growth (GR).

Because our data are a panel, we can account for unobserved country characteristics by including either fixed or random effects in the model, and do not have to rely only on OLS. It is important to do so, because it is conceivable that both growth rates and changes in manufacturing shares and agriculture could be caused by some underlying factor.

A central assumption in random effects estimation is the assumption that the random effects are uncorrelated with the explanatory variables. One common method for testing this assumption is to employ a Hausman (1978) test to compare the fixed and random effects

estimates of coefficients (for discussion see, for example Wooldridge (2002), and Baltagi (2008), that in this study, fixed effect estimation was confirmed. A Hausman test (of random vs. fixed effects) rejects the plain random effects model for our data.

## **6. CONCLUSION**

The paper attempts to empirically test the relationship between contribution of Industry and agriculture of exports to economic growth. This Study by using a panel data approach for 34 developing countries, finds that all variables in their levels are non-stationary and become stationary at their first difference. We used fixed effect for estimating our model and result show that agricultural exports have no effect on economic growth. Instead, we have found gross fixed capital formation is vital for economic growth of developing countries in long run. Furthermore, the contribution of manufacturing export and final government expenditure to economic growth is positive and significant. By and large, an increase of 1 percent in manufacturing export, government final consumption and gross fixed capital formation respectively leads to 0.2, 1 and 0.6 percent increase in economic growth.

We suggest that governments of developing countries should try to stimulate the firm to investment, especially in the industrial sector by improving business environment. Also, they can make structure change in agriculture sector by converting agriculture export into value add products. Furthermore, we discussed that countries have to produce industrial goods to pan industrialization and experience high economic growth. Because developing countries produce their natural resources and since primary exports are usually raw and unprocessed while manufactured goods are more technologically intensive, and more likely to create positive spillovers. Therefore, developing countries should not be oblivious the industrial sector.

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