THE IMPACT OF TRADE OPENNESS, LABOUR AND CAPITAL ON MANUFACTURING VALUE ADDED IN IRAN

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Abstract *One of the most fundamental issues in the economy, after World War II, particularly, in developing countries, is high economic growth. There are many factors which are effective in creating growth in these countries, the most important of these factors is increasing value added in productive goods and services in each country. In this aspect, we attempt to establish relationship between macro variables and manufacturing value added. Thus, in this research, the long-run and short-run relationship has been considered between the explanatory variables of labour, fixed capital and trade openness and dependent variable (the manufacturing value added). Method used in this study, is the Autoregressive Distributed Lag (ADRL) model in which the coefficients related to the dynamic models (short term and long term), Error Correction Method (ECM) in connection with the manufacturing value added are studied for Iran during the period of 1961-2006. The results show that the trade openness, both in the short term and in the long term has a significant and positive effect on Iran's manufacturing value added. Also, labour and capital variables have important impact on manufacturing value added both in the long-run and short-run relationship*

Key Words: *Manufacturing value added, Trade openness, Autoregressive Distributed Lag*

1. INTRODUCTION

One of the most fundamental issues in the economy, after World War II, particularly, in developing countries, is high economic growth. There are many factors which are effective in creating growth in these countries, the most important of these factors is increasing value added of productive goods and services in each country. Considering the increase in manufacturing value added, recognizing effective factors (for example; labour, trade openness and fixed capital), on value added is necessary.

Trade openness has emerged as the main argument among economists and policy makers in explaining the growth phenomena in developing countries (Dawson, 2006; Dutta & Ahmed, 2001; Edwards, 1992; Salehezadeh & Henneberry, 2002; Weinhold & Rauch, 1999). Besides, due to continuous interest on the issue, new methods were also proposed (Lloyd & MacLaren, 2002; Ruíz Estrada & Yap, 2006). The positive contribution of trade openness towards growth stemmed from the notion that liberalisation increases specialisation and division of labour thus improving productivity and export capability as well as economic performance. In addition, with greater efficiency as a result of trade openness, many of the developing countries followed suit with the export-led strategies. It is found that countries with more trade openness relatively outperformed the countries with less openness (Thirwall, 1994; World Bank, 1993). A study by Lloyd and MacLaren (2000) on the East Asian economies supported a similar opinion that the rapid growth was largely caused by East Asia's economic openness. Other noteworthy studies supporting the openness and growth relationship include Urata and Yokota (1994), Osada (1994), Kajiwara (1994), Hwang (1998), Edwards (1998), Jonsson and Subramanian (2001), Farhadi (2004), Mahdavi and Javadi (2005) and Gorji and Alipourian (2006). In contrast, some scholars (Harrison, 1996; Rodríguez & Rodrik, 2001), however, have been more reserved in supporting the openness-led growth nexus. Although there are considerable number of studies examining the relationship between trade liberalisation and

growth in developing countries (including Dollar, 1992; Edwards, 1992; Sachs & Warner, 1995; Sarkar, 2008; Yanikkaya, 2003), these studies are still far from complete. First, in the case of Iran, previous empirical studies relying on cross-country panel data analysis showed mixed results. Second, while many studies have provided empirical evidence on the impact of trade openness and economic growth at nation level, analysis within the framework on manufacturing industries are solely lacking. The lack of analysis at sectoral level may have contributed to the empirically mixed results reported in the previous literature. This study shows that giving emphasis to the wrong sectors or treating all countries to be homogenous in nature may lead to biasness. Hence, inference drawn from this study provides general understanding and guidance for policy formulation. Third, many studies have ignored the causation between two variables, which is deemed important in econometric exercise and for policy implication. Generally, the nations with higher growth can also exhibit higher level of openness. Hence, we tested the causality between trade openness and manufacturing growth in a multivariate system by incorporating other basic determinants of manufacturing growth such as labour and capital. This was due to the argument that bivariate causality may lead to biasness due to the omission of variable phenomenon (Al-Yousif and Yousif, 1999). Furthermore, from the theoretical point of view the inclusion of other important determinants (such as labour and capital) would avoid potential mis-specification. Lastly, we adopted a more recent co-integration test called the Bounds Test developed by Pesaran, Shin, and Smith (2001) to establish if the variables are co-moving. Mah (2000) cautioned on the inference problems inherent with co-integrating analysis that has a small sample size. The Error Correction Model (Engle & Granger, 1987), Johansen (1988) and Johansen and Juselius (1990) methods are unreliable for studies that have small samples. Hence, the proposed method has a major advantage over the traditional co-integration proposed by Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1992). The Bounds Test is robust in dealing with a small number of observations and does not require the regressors to be in the same order of integration. Therefore, serious questions concerning the robustness of the co-integration tests could be limited compared to other studies that used Johansen's method for small observations (less than 100). The primary objective of this study is to address the above gaps and to re-examine the impact of trade openness on the Iranian manufacturing sector. The reminder of the study is organized as follows. The data and empirical model applied in this study is described in Section 2. Section 3 describes the methodology of the study. Section 4 presents the empirical findings while Section 5 discusses policy implications and the conclusion.

2. DATA AND MODEL SPECIFICATION

Annual data was used from 1961 to 2006, which was obtained from the 'Iran Economic Statistics-Time Series' published by the Department of Statistics, Iran. This department had selected 1997 as the base year. The series includes manufacturing value added output, gross fixed capital, number of labour and trade openness. Due to data limitation for the computation of capital stock, we used the fixed assets as the proxy for capital. Manufacturing value added was deflated using the manufacturing producers price index while fixed assets was deflated using gross domestic fixed capital formation deflator with 1997 as the base year. The proxy used for labour is labour force employment. The trade openness is calculated as a ratio of manufacturing import plus export to manufacturing output. The relationship between manufacturing value added, capital, labour and openness in the multivariate model can be specified as follows:

$$VA_t = f(CA_t, LA_t, OP_t) \qquad (1)$$

Where, VA_t, CA_t, LA_t and OP_t are manufacturing value added, gross fixed capital, labour and trade openness, respectively.

3. METHODOLOGY

The works of Engle and Granger (1987) and Toda and Phillips (1993) have shown that ignoring the existence of co-integration in the series could lead to serious model mis-specification. There are two ways of performing the co-integration tests; the Johansen co-integration using Maximum-Likelihood Method (Johansen, 1988) and the fairly new method known as "Bounds Testing Approach" suggested by Pesaran et al. (2001). Owing to the limited size of observation, the Bounds Test is preferred over the Johansen method, which is mainly appropriate for a large sample size. Thus, in this study, we perform the co-integration tests using the Autoregressive Distributive Lag (ARDL) Method proposed by Pesaran et al. (2001). This involves testing the following Unrestricted Error Correction Models (UECM):

$$VA_t = \hat{a}_0 + \hat{a}_1 Z_t + \hat{a}_2 CA_t + \hat{a}_3 LA_t + \hat{a}_4 OP_t + \varepsilon_t \qquad (2)$$

In order to test the absence of a long-run relationship in (2), we conduct a Wald-type (*F*-test)

Coefficient Restriction Test, which entails testing the following null hypothesis.

$$H_0 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0 \qquad (3)$$

In this research, for testing null hypothesis in (3), we apply:

$$\frac{\sum_{i=1}^{p}\hat{\phi}_i - 1}{\sum_{i=1}^{p} S_{\hat{\phi}_i}}$$

$\varnothing_i$: Total of lag Coefficients of dependent variable $S_{\varnothing i}$: Standard Error

The computed statistics are compared with critical quantities (absolute), in Banerjee, Dollado and Mastree table. If the computed *t*-statistics is greater than Banerjee, Dollado and Mastree table, then we reject H_0 and conclude that the dependent variable and the regressors are co-integrated.

4. EMPIRICAL FINDINGS

This division investigates the result of estimated ARDL method, in three output, short-run and long-run model and Error Correction Method (ECM). Table 1 reports the short-run result. The lag length selection was determined using the Schwars Bayesian (SBC). Due to the small sample size, we allow a maximum lag length of three. The optimal lag length is found to be two. The long-run relationship between the manufacturing value added output, capital, labour and openness has tested using the 'Bounds Test'. Based on the 'Bounds Test' (in Table 1), the computed t-statistics is -3.36, and because this number (at the 5% significance level), is greater than Banerjee, Dollado and Mastree table (2.85), so we reject H0 and conclude that the dependent variable and the regressors (labour, capital, trade openness) are co-integrated.

$$\frac{\sum_{i=1}^{p}\hat{\phi}_i - 1}{\sum_{i=1}^{p} S_{\hat{\phi}_i}} = \frac{0.70925 - 1}{0.86595} = -3.357$$

Table 1: Autoregressive Distributed Lag Estimates ARDL (1, 1, 0, 0) selected based on Schwars Bayesian Criterion Dependent variable is VA 44 observations used for estimation from 1962 to 2006

T- Ratio	Standard Error	Coefficient	Regressor
8.1904	.086595	.70925	VA(-1)
4.4470	.14439	.64209	CA
2.3012-	.16078	.36998-	CA(-1)
3.4187	.16873	.57686	OP
4.7521	.0020642	.0098094	LA
4.3985-	.17622	.77512-	C

$R^2 = 0.99584$ $\bar{R}^2 = 0.99529$

$F(5,38) = 1818.1$ $DW = 1.9631$

Having found a long-run relationship between manufacturing value-added and trade openness, labour and gross fixed capital when *VA* serves as the dependent variable, we proceed to estimate the long-run coefficients. In other words, we investigate the impact of trade openness, labour and gross fixed capital on manufacturing value added output. The long-run coefficients, were estimated using the Autoregressive Distributed Lag (ARDL) Model. Based on the SBC, the ARDL [1, 1, 0, 0] was found to be the optimal model. Estimated Long-Run Coefficients are following:

Table 2: Estimated Long-Run Coefficients using the ARDL Approach ARDL (1, 1, 0, 0) selected based on Schwars Bayesian Criterion Dependent variable is VA 44 observations used for estimation from 1962 to 2006

T- Ratio	Standard Error	Coefficient	Regressor
3.031	.30878	.93591	CA
2.4854	.07982	.198407	OP
6.1786	.0054605	.33739	LA
3.415 -	.07806	-.266597.6	C

In the long-run trade, openness has a significant positive impact on manufacturing value added in Iran. 1 unit increase in trade openness (at the 5% significance level), will result in 0.20 unit increase in real manufacturing value added. Also, capital and labour variables in the long-run have a significant positive impact on manufacturing value added in Iran. 1 unit increase in labour and Gross Fixed Capital (at the 5% significance level) will result in 0.34, and 0.93 unit increase in real manufacturing value added, respectively.

The *ECM* (in Table 3), is −0.291 and was found to be statistically significant at the 5% significance level. This suggests that in the long-run *CA*, *LA* and *OP* cause *VA*. This means that causality runs interactively through the *ECM* from *CA*, *LA* and *OP* to *VA*. The magnitude of the *ECM* term suggests that a deviation from the equilibrium level of *VA* during the current period will be corrected by 29% in the next period. Additionally, this provides further support for our co-integration analysis earlier. It also provides support for the endogeneity of the dependent variable (*VA*) with respect to the long-run parameters.

Table 3: Error Correction Representation for the Selected ARDL Model ARDL (1, 1, 0, 0) selected based on Schwars Bayesian Criterion Dependent variable is dVA 44 observations used for estimation from 1962 to 2006

T- Ratio	Standard Error	Coefficient	Regressor
4.447	.14439	.64209	dCA
3.4187	.16873	.57686	dOP
4.7521	.0020642	.0098094	dLA
4.3985-	.17622	.77512-	dC
3.3575-	.086595	.29075-	Ecm(-1)

$$ecm = VA - .93591 * CA - 198407.5 * OP - .33739 * LA + 266597.6 * C$$

$$R^2 = 0.7373 \qquad \bar{R}^2 = 0.70273$$

5. POLICY IMPLICATIONS AND CONCLUSIONS

In this study, we perform the Co-Integration Test using the Autoregressive Distributive Lag (ARDL) Method between manufacturing value added and trade openness, capital and labour.

The results suggest that there are long-run relationship between manufacturing value added output and the regressors (capital, labour and openness).

The computed *t*-statistics show that at the 5% significance level, trade openness is positively related to manufacturing growth in Iran, and this effect in long-run as compared with short-run has been more. Also, labour and gross fixed capital variables have important impact on manufacturing value added both in the long-run and short-run. However, compared to capital investment, trade openness played far greater role in manufacturing sectors. More importantly, this has interesting implications for policy makers. It shows that even though investment is important, without free export and import regime, the manufacturing growth could be at stake. With manufacturing sectors being more labour intensive (as shown by the greater impact of labour) and less technologically progressed, trade openness (both exports and imports) are crucial. Additionally, due to lack of domestically produced intermediate inputs and capital goods, the liberalisation of import regime played a major role. This is consistent with the argument that trade provides access to investment and intermediate goods for development process (Yanikkaya, 2003).

Thus, Error Correction Method (ECM) is significant, and confirms long-run relation and shows that, short-run model adjusts toward long-run model after 3.44 year, it means if a shock is created on independent variables of model, the effect of this shock evaporates almost after 3.44 years and stabilize the dynamic models (short term) to form long-run model.

Considering the above, the policy direction of Iran should emphasise on more liberal policies, with emphasis on how (which manufacturing sectors) and when openness is actually important. With limited domestic market, the export-led strategy is not an option, but a must for the sector to grow. Additionally, policy makers should also simultaneously direct policy towards institutional arrangements that would help leverage the benefits of an open policy such as that which is observed in Korea, Taiwan, and Hong Kong. Additionally, it is suggestive that moving from import substitution policy to outward oriented policy especially for small nations is vital to promote growth. As such policy makers in such small countries need to consider and assess the implications of directing policies towards being a more open economy.

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