

UDC 339.546:338.121].001.573(497.7)"1998/2006" EXPORT-LED GROWTH HYPOTHESIS: EMPIRICAL EVIDENCE FROM MACEDONIA

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Abstract

The aim of this study is to empirically test the export-led growth hypothesis in the Republic of Macedonia, as small and open economy. In other words, the question trailed is whether by export promotion the country could impinge on its overall economic development. For that purpose, quarterly data for the period 1998-2006 are plugged into the production function, in which the exports variable plays dominant role, utilized in cointegration testing and vector error correction model. The core findings are supportive to the ELG in Macedonia in the short- and long-run simultaneously. Also, gross capital formation is significant in explaining growth in Macedonia.

Keywords: *Export-led growth, Macedonia, Cointegration analysis, Vector error correction model*

JEL classification: *C22, C51, F43, O40*

Introduction

A field of academic interest that has spurred hotted debates among academicians and policy makers is whether there exists a relationship between the exports and the economic growth. In that sense, many studies devoted to the endeavour to empirically test the hypothesis according to which export promotion strategies accelerate the speed of the economic growth. The latter became known as the Export-led Growth Hypothesis.

*) Thoughts and opinions expressed in this text do not necessarily present the stance of the Ministry of Finance or Euro College.
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The ELG hypothesis postulates a positive link between exports performance and economic growth and it is generally associated with developing economies, because it is believed that they can improve their growth by intensified exports orientation. Alternatively, the ELG hypothesis squabbles that a country should seize the way of export promotion instead of import substitution. In that manner of reasoning, strengthened exports will enable these economies with thin domestic markets to override the size constraints and to reap economies of scale. As well, higher exports will lead to intensified foreign exchange infusion, which, in turn, facilitates the imports of capital goods, in that way strengthening the productive capacity of the economy. Moreover, higher exports stimulate the efficiency and thus competitiveness of the economy, adds to productivity gains etc (Kemal et al, 2002).

The above articulation leads to the importance of this causal relationship. Namely, ELG possesses important implications for policy-makers' decisions in the context of the appropriate growth and development strategies and policies to adopt.

This study investigates the ELG hypothesis in the light of the developing countries, particularly the case of the Republic of Macedonia. The objective is to assess whether Macedonian experience provides support for this hypothesis. Therefore, the remainder of the paper is organized as follows. The next part portrays the theoretical background of the ELG, pointing out the causality issue. The third part encompasses a review of the literature summarising the previous studies by the criterion of the evolution of the applied methodology for investigation of the topic. The empirical part is entirely dedicated to the ELG in Macedonia, portraying the data, describing the methodology which is based on the VAR framework, the applied model, based on the production function and the core findings. Finally, the last part concludes the paper.

Theoretical background

The essence of the export-led growth

The macroeconomic theory acknowledged that there is a causal relationship between the exports growth and the economic growth in a country, which became known as the Export-led growth hypothesis. The channels through which the spurred export implicates output growth are various. Export expansion can be a catalyst for output growth both directly, as a component of aggregate output, as well as indirectly through efficient resource allocation, greater capacity utilization, exploitation of economies of scale and stimulation of technological improvement due to foreign market competition (Awokuse, 2003).

At an outset, export growth could represent an increase in the demand for domestic goods and therefore it increases the real output. Secondly, the intensified exports of a country, allows for an increased foreign exchange inflows within the economy, which, in turn, will be a solid base for enhancing the imports. In the sense of the latter, if the imports' strengthening goes on the account of capital goods, than this directly adds to the improved economic growth in the economy (Kemal et al, 2002). Moreover, this improved money inflow from abroad will facilitate the debt servicing and may eliminate ultimate controls that result in an overvaluation of the domestic currency. Then, the development of the export sector tends to concentrate investment in the most efficient sectors of the economy where it exhibits comparative advantages. In turn, the narrow specialisation in these sectors will enhance the productivity in the economy, hence leading to a higher output. This effect is called Verdoorn's Law, after P.J. Verdoorn who suggested it in 1949 (Giles and Williams, 1999).

Furthermore, export growth through an expanded market base allows for the exploitation of economies of scale for open economies and promotes the transfer and diffusion of technical knowledge in the long run (Grossman and Helpman, 1991), as well a learning-by-doing gains and better management practices (Romer, 1990), which result in additional efficiency gains. In that sense, export-oriented strategies may provide better opportunities and rewards for entrepreneurial activity which could be beneficial for the economic growth, as entrepreneurs are those that seek opportunities and undertake risks.

In summary, all these facilities that stem from the practicing of the export oriented strategies for boosting the output, tend to invigorate each other, thus encouraging further expansion of exports, investment and consumption. The overall result will be a noteworthy rise in the growth rate of output.

Although aforementioned channels for exports' influences on growth are proved and practically viable, the support of the ELG is not universal. For instance, Buffie (1992) developed a CGE model of a small open developing economy (as Macedonia is) and tried to determine whether an export boom acts as an engine of the growth. The first and foremost answer was that it depends on the structural characteristics of the economy, thus accentuating the notion that the ELG hypothesis is not supportive in every case. Another issues arise in this context: the saturation of the markets in developed economies for the exports of the less-developed economies, trade barriers etc.

Growth-led exports: Bi-directional relation?

Although the vast majority of the literature concentrates on analyzing and verifying the ELG hypothesis where the causation stems from the exports to the growth, the reverse causality stemming from output to exports is also plausible (Kemal et al, 2002). This is known as Growth-leg exports or GLE hypothesis. Namely, in a developing country, there are some sectors of the economy, if not the majority of them, that expand on a rapid pace. However, the assumption that the domestic demand in these countries will follow the pace of the growth of these industries is rather flawed. Consequently, these industries will seek foreign markets for placement of their products. In this situation, the increased output in the economy, boosted the exports. In addition, this output growth spurs investment, part of which goes for capacity increasing to the exports. Also, Krugman (1984) explains the GLE hypothesis in the light of enhanced skills and technology in a growing economy, which in turn leads to an increased efficiency creating a comparative advantage for the country, which then facilitates exports. However, he argues that as well market failure, which will request government intervention, may result in GLE.

Finally, in addition to the growing body of literature supporting ELG hypothesis and that of the reverse causation, some studies, like that of Pack (1988), found no causal relationships between exports and growth. Moreover, if real output is induced by an exogenous increase in consumer demand that is highly concentrated in exportable and non-traded goods, then a decrease in exports would occur, thus suggesting a negative link between the two variables. Also, increased exports from some types of foreign direct investment might lower domestic output due to various distortionary effects (Jung and Marshal, 1985).

Literature review

Unabridged body of literature examines the relationship between exports and output growth in the framework of the ELG hypothesis. The latter posed challenges long period before; what has been changing through the time were the ways of how this has been scrutinized.

For instance, the early studies on ELG analyzed the issue by estimating the correlation coefficient of the exports and GDP growth. Tyler (1981) does this on a sample of 55 middle income developing economies. Specifically, he uses bivariate correlation tests, revealing that a strong positive association between exports growth and economic growth exists. Kavoussi (1984) follows the same pattern as Tyler (1981) on a sample of 73 developing countries and finds that export expansion is associated with better economic performance in both groups of low- and middle-income countries. However, estimating the ELG with correlation tests was later on considered as rather flawed. Kemal et al (2002) argues, in that context, that the relationship between the exports and output growth can not be taken as an indication of causality between the exports growth and the output growth, mainly because it is a question of causality which is a dynamic one and thus can be meaningfully studied only in a dynamic framework based on time series data.

Having on mind the dynamic component of the issue, a lot of studies examine the ELG using standard OLS technique. For instance, Schenzler (1982), Ram (1987), Sengupta and Espana (1994a), Amirkhalkhali and Dar (1995) were all investigating the ELG hypothesis by plugging annual data into OLS estimation technique for various countries or groups of countries and found strong positive relationship between the exports growth and output growth in the examined cases. Yet, using the same technique, there were some studies that found a support for the GLE hypothesis (Riezman et al, 1996), as well those that did not implicate any effect between exports and GDP (for instance, Sengupta and Espana (1994b), for the case of Japan). Yet again, the causality issue was addressed as a problem.

Consequently, numerous studies employed Granger's (1969) and Sims' (1972) causality tests. A pioneering step in that regards is being made by Jung and Marshal (1985) who analyze the relationship underlying ELG for 37 developing countries, and found a support for the ELG only in 4 countries included in the assessment: Indonesia, Egypt, Costa Rica and Ecuador. What now has been posed as a problematic issue was that tests like the abovementioned ones could be inappropriate in a setting where variables are non-stationary and share a common stochastic trend. To address this issue, more contemporary studies explore the ELG in the VAR framework. VAR works with stationary series only, i.e. series that do not contain a unit root. In that sense, if two series are non-stationary after being differenced d times, the combination of two series could lead to stationarity. Then, a restricted VAR or vector error correction model is used.

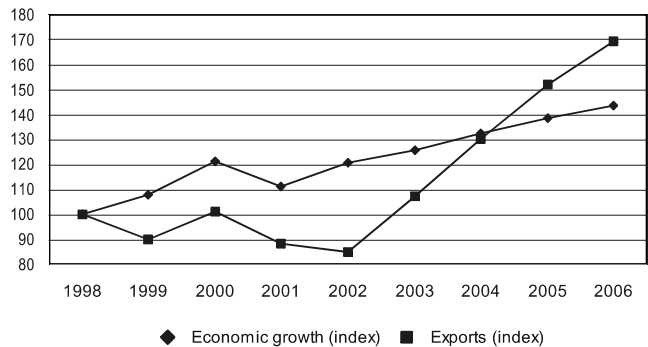
Plenty of studies examine the issue in the VAR framework, however, due to the restrained space here, I will point out only those that are most important. For example, Bahmani-Oskooee and Alse (1993), Dutt and Ghosh (1996), Xu (1996), Kemal et al (2002) are few of them that address the ELG hypothesis. Bahmani-Oskooee and Alse (1993) investigate the linkage between the exports growth and output growth for 9 developing countries within the VEC framework and find a strong support for the ELG for all of them. Similarly, in a study of 26 low-, middle- and high-income countries, Dutt and Ghosh (1996) provide evidence in favor of the ELG hypothesis in roughly half of the countries. In another study along the same lines, Xu (1996) finds evidence of ELG in 17 out of 32 developing countries included in the analysis. Kemal et al (2002) in a similar manner explore the ELG for several countries in South Asia and found that export growth had been instrumental in accelerating economic growth in all the economies. Awokuse (2003) applied VAR and VEC on the Canadian economy. The empirical evidence from the both tests indicated that changes in real exports precede changes in real GDP. VAR confirmed the ELG in a short-run, while the results from cointegration analysis and restricted VAR also provided support for ELG in the long-run. Though, applying the same advanced techniques belonging to the VAR framework, Pomponio (1996) found support for the GLE hypothesis in the cases of Algeria and Tunisia, but no causality was detected for Morocco, Sudan or Turkey. Also, ELG is examined for nine Middle East and North Africa (MENA) countries in three-variable vector autoregressive and error correction models, and ELG hypothesis is rejected in almost all examined countries when total exports is considered. However, when considering only manufactured exports, there is no causality for countries with relatively low shares of manufactured exports in total merchandise exports and a bi-directional causality for countries with relatively high shares (Abu-Qarn S. and Abu-Bader, 2004).

All in all, huge part of the macroeconomic literature studies the relationship between the export growth and output growth. While the majority of it did find a strong support of the ELG hypothesis, some studies concluded that exactly the opposite direction holds or no significant causation exists. What should be noted that all these studies encompass various countries, albeit mainly developing economies, utilize distinct techniques and models. Even in the VAR framework, some studies simply regress exports on output, whereas some other use the production function, employ the manufacturing exports etc.

Empirical facts from Macedonia

Macedonian economy and the ELG

Macedonia is a developing country that has experienced many difficulties during its period of transition towards free market economy. In that sense, Macedonia achieved and maintained significant macroeconomic stability, mainly due to the exchange rate strategy of pegging the denar to the euro. Yet, the economic growth performance in the years of transition was rather unsatisfactory. Although the growth rates were positive (except in 2001), they remained moderate and insufficient for more noteworthy economic boom. Though, one of the pillars of the growth strategy in Macedonia is the exports performance of the economy. Albeit significant advancements are made on the field of exports promotion and its intensification, the overall assessment is that it remains rather low and uncompetitive on the world market. However, the export is growing in the last few years, with significant rise in 2006 particularly. Also, positive GDP growth rates are recorded in these years which portrays the basis for conducting an analysis whether the ELG hypothesis holds for Macedonia.



Data

Since this study tests the ELG hypothesis, what I employ as inputs is quarterly data for the period 1998-2006 for the Macedonian economy. Quarterly data enable enough periods for solid model thereafter. Following variables are included: exports, gross domestic product, gross capital formation and the number of employees as an approximation of the capital and the labor, respectively. These are scrutinized in a production function formula. I will use a dummy variable to capture the negative effects of the military conflict in 2001 on output and exports performance.

Methodology

VAR Framework

For the case of the Republic of Macedonia, I will test the ELG within the framework of the vector autoregressive analysis, applying the concept of Granger causality, following Vogelvang (2004). The latter is based on the following VAR model:

$$x_t = a_0 + \sum_{i=1}^m b_{0i}x_{t-i} + \sum_{j=1}^n c_{0j}y_{t-j} + \varepsilon_t$$

$$y_t = a_1 + \sum_{i=1}^p b_{1i}y_{t-i} + \sum_{i=1}^q c_{1i}x_{t-i} + \varepsilon'_t$$

If the c_{0i} are jointly significant but c_{1i} are not, there is unidirectional causality from y_t to x_t . On the other hand, if c_{1i} are jointly significant but c_{0i} are not, there is unidirectional causality from x_t to y_t . There is bi-directional causality between the two variables if both sets of coefficients of the lagged independent variables are jointly significant in their respective equations.

However, the Granger causality test applies only if inputted series are stationary and do not share a common stochastic trend. Otherwise, the test could provide flawed results. Majority of economic variables become stationary after being differenced of order one. If a time series turns out to be non-stationary, then the recommended approach for testing for the Granger causality is the Cointegration and Error-Correction framework.

Integration and cointegration

It is said for the variable x_t to be integrated of order d if it becomes stationary after being differenced d times. Therefore, the first step is to determine the integration characteristics of the employed series. This is accomplished by the Augmented Dickey-Fuller and Phillips-Perron tests. If the calculated ADF test statistic is less than the critical value, the null hypothesis of a unit root cannot be rejected and x is said to be non-stationary. The order of integration of the variable is determined by applying the same procedure on its first difference. The series will be integrated of order one if its first difference does not possess a unit root.

Yet, if individual time series turn out to be non-stationary in their levels (contain stochastic trends after being differenced), it is possible that stochastic trends are common across series leading to stationary combinations of the levels. In that manner, in a bivariate setting, a linear combination of two variables may be stationary although each variable follows a random walk process. This is known as cointegration. For the cointegration testing, I use Johansen testing procedure, which involves the estimation of a vector error-correction model (VEC) in order to obtain the likelihood ratios, based on which the cointegrating rank of the series is being judged.

Unrestricted and restricted VAR model (error correction model)

VEC combines the short-run dynamics with the long-run properties of the data and thus provides a convenient tool for investigating short-run as well as long-run causal patterns. The error-correction models are formulated as follows:

$$(1-L)x_t = a_0 + b_0\varepsilon_{t,i} + \sum_{i=1}^m c_{0i}(1-L)x_{t-i} + \sum_{j=1}^n d_{0j}(1-L)y_{t-j} + \varepsilon_t$$

$$(1-L)y_t = a_1 + b_1\varepsilon'_{t,i} + \sum_{i=1}^p c_{1i}(1-L)y_{t-i} + \sum_{j=1}^n d_{1j}(1-L)x_{t-j} + \varepsilon'_t$$

Where L is the lag operator and the error-correction terms ε and ε' are the stationary residuals from the cointegration equations. These terms reintroduce the long-run information in the levels of the variables that is lost in the first differencing and thus provide an additional channel - the adjustment of variables towards a long-run equilibrium - through which causality can be detected. Therefore, as long as the error-correction term has a significant coefficient, the error-correction model allows for the possibility that y Granger-causes x , even if the d_{0i} 's are not jointly significant.

Empirical results

Having described the econometric technique for the investigation of the topic, on this space, I will present the results of the model specification and estimates.

Unit roots and cointegration

In order to test for unit roots of the included series, I pursue the Augmented Dickey-Fuller test, using the Akaike information criterion in order to choose the optimal lag length. I use maximum 9 lags, since using higher number of lags weakens the integration characteristics of the included time series.

The results show that the variables of exports, the gross domestic product and labor are integrated of order 1, i.e. $I(1)$. Only the investment variable, approximating the gross capital formation does not contain unit root and is integrated of order 0, i.e. $I(0)$.

With the Johansen test onwards, I determine whether the variables (the four included in the study) share a common stochastic trend, i.e. whether are cointegrated. According to the results shown below, both trace test and max-eigenvalue test indicate the existence of one cointegration relationship at both 5% and 1% significance level.

Unrestricted Cointegration Rank Test				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.650691	59.78787	47.21	54.46
At most 1	0.341515	24.02673	29.68	35.65
At most 2	0.241128	9.821069	15.41	20.04
At most 3	0.012850	0.439737	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level Trace test indicates 1 cointegrating equation(s) at both 5% and 1% levels				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.650691	35.76114	27.07	32.24
At most 1	0.341515	14.20566	20.97	25.52
At most 2	0.241128	9.381332	14.07	18.63
At most 3	0.012850	0.439737	3.76	6.65
*(**) denotes rejection of the hypothesis at the 5%(1%) level Max-eigenvalue test indicates 1 cointegrating equation(s) at both 5% and 1% levels				

According to Granger representation theorem, a system of cointegrated variables has an error-correction representation, combining the short run dynamics of the variables with their long run properties. Consequently, restricted VAR or VEC model is estimated, otherwise, unrestricted VAR is used. Since in the case of the Republic of Macedonia I determined existing one cointegration equation, I specify the model in the VEC framework.

The model

Although the above discussion leads to the conclusion that a proper way for testing the ELG is to regress exports on output growth, still some studies capture this effect in the framework of the aggregate production function (Balassa, 1978; Sheehey, 1990). The aggregate production function is specified as follows:

$$Y = f[(K, L); X]$$

Where Y stands for the GDP growth, K, L, and X represent real capital, labor and real exports, respectively.

Following the above discussion, I firstly specify the regression which is the basis for the error correction estimation:

$$\log(\Delta y) = \alpha + \beta_1 \log(\Delta x) + \beta_2 \log(k) + \beta_3 \log(\Delta l) + D + \varepsilon_t$$

At an outset, I performed seasonal adjustment to the export variable and the output. Next, I determine the optimal lag length on the basis of Akaike Information criterion. According to this criterion, the optimal VEC order is 7, which in this case corresponds to a lag length of 21 months. Results from the Granger causality tests based on error correction estimation are shown in the next table.

Direction of causation	Error correction term (t-stat)	Significance of the included lags	F statistics	R-square
Export-led growth	-3.72497***	3	11.64857**	0.963248
Growth-led exports	-0.06263	none	2.778889	0.862117

*, **, *** indicates significance at 10%, 5% and 1% level respectively.

The second column stands for the t-statistics for the error-correction terms, while the third column for the F-statistics for the joint significance of the lagged explanatory variables in the causality equation. Moreover, F-statistics confirms the validity of the R-square, which points out the fitness of the model.

The first row of the table indicates that the error correction term is significant at 1%-age level, having on mind that the lagged exports exhibits significance up to the third quarter in explaining the output growth. Also, the β coefficients in front of the lagged exports variable are positive, which is the expected sign. R-square is high, 96%, which emphasizes the goodness of fit of the above specified model, while F-statistics confirms this figure. For each variable in the system (GDP and exports), at least one channel of Granger causality is active: either in the short-term through the joint tests of lagged differences or a statistically significant ECT. The last channel is facilitated by the VECM specification and implies that past equilibrium errors play a role in determining present outcomes. Whereas the short-run dynamics is captured by the individual coefficients of the differenced terms. Consequently, presence of long-term and short-term causality from exports to growth is determined in the case of the Republic of Macedonia. Namely, it is evident that the results support the hypothesis of long-run causality from exports to GDP, as presented by the t-statistics of the ECM. Also, the short-run causality in the same direction is confirmed, as presented by the F-statistics.

Returning to the initial model stemming from the production function, only the variable that approximates the gross capital formation as an ingredient of the overall output growth in the economy, exhibited significance at 5%. Also the sign is positive, which articulates that as the gross capital formation strengthens, the output of the economy expands, which is theoretically correct and expected. Neither the labour variable nor the imposed dummy showed significance. Furthermore, other variables that seem to improve the model, like the foreign output shocks that hit the economy or the domestic demand could have been added, though such miss due to lack of appropriate data for Macedonia.

All in all, the results presented above provide strong empirical facts in support of the ELG hypothesis in the case of the Republic of Macedonia for the prescribed period in this study.

Interpretation

The economic interpretation of the existence of short-term and long-term causality stemming from exports to the output growth gains on pleasant appearance. For instance, taking into consideration the short-term time preference, exports could feed the output growth by utilizing the excess capacity of the economy which does not meet sufficient domestic demand at full capacity production. "The presence of short-run causality is also consistent with the Keynesian view, which postulates that changes in the components of aggregate demand lead to changes in aggregate output in the short run." (Kemal et al, 2002, p.27).

Turning the view to the long-term perspective, the exports could facilitate the output by a variety of channels, distinctively listed in the theoretical section above. Briefly, these include benefits from the higher foreign currency inflows which will lead to an expanded imports of capital goods, which, then, postulate the productive capacity of the economy, then economies of scale due to the larger markets and improvement of the overall efficiency of the economy, enabling productivity gains and specialization in the economy for exploring its comparative advantages.

Conclusion

The question that has been put forward in this study was whether there is causality between exports and output growth in the case of the Republic of Macedonia in support of the export-led growth hypothesis.

The theoretical platform at which the paper is built on, accentuates that the influence of exports on GDP could be conducted through several ways: economies of scale, expanded foreign exchange infusion which will enable improved imports structure, diversification and specialisation of the domestic production and benefiting from the comparative advantages of the national economy. And this is, probably, the most well functioning channel of development for small and open developing economies. However, an environment with strengthening growth and economic outlook could be a fertile ground for fostering growth, therefore pointing to a reverse order of this causation known as growth-led exports.

Extended on the previous empirical studies for the same issues, this theoretical background has shown that ELG is the most common, however not the universal outcome. Studies that captured this influence are ranging from those that found strong support of the ELG to those that found exactly the opposite or even concluded no causal linkage. All of them, also, differ by the examined period and the modelling technique.

To determine whether Macedonian exports and growth data are consistent with ELG or not, I pursued vector error correction modelling technique in which the analysis was concentrated on the dynamic causal relationship between output growth, exports, capital and labour, using quarterly data for the period 1998-2006. Based on these specifications, I found that changes in exports in Macedonia precede changes in GDP. In other words, I identified a strong support for the ELG hypothesis in Macedonia. This applies in the short-run, as well in the long-run, judging by the cointegration and VEC analysis.

Possible drawback of this study could be identified in the course of the omitted variables, which, however, might only strengthen the quality of the results. Also some studies like that of Awokuse (2003) accentuate the lack of explanation for the linkage between exports and productivity growth in such studies. In that context possible further research area could be the investigation of this relationship for the Republic of Macedonia, so that this study could be considered as a solid platform in that effort.

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