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Abstract

This study empirically examines on the role of international trade on economic growth in Mexico. To allow for potentially dynamic, as well as endogenous, patterns often associated with exports, imports, and growth, the analysis relies upon time series approaches involving causality and vector error correction methods. Results indicate that imports play a more critical role than exports do for economic growth in Mexico. As such, the outcomes contribute to the growing body of international evidence regarding import led growth in the global economy.

International Trade and Economic Growth in Mexico

Introduction

A growing body of international evidence highlights the importance of international trade for economic growth and development. Along those lines, many studies also indicate that imports play a critically important role in the growth process for many economies. Because of the complex nature of economic development, empirical analyses frequently employ techniques that allow for dynamic, and frequently endogenous, relationships among the variables employed in such studies.

This study examines the role of international trade with respect to economic growth in Mexico. During much of the twentieth century, Mexico adhered to import-substitution growth strategies. Eventually, the government shifted gears in favor of export-oriented growth policies. Imports may also contribute to growth via increased capital stocks, access to new technologies, and the generation of new ideas (Romer, 1994).

The paper investigates potential dynamic linkages between international trade and economic growth. The study is organized as follows. Section two provides a review of pertinent literature on this topic. The next part of the paper discusses the theoretical framework and data. Empirical outcomes are summarized in the fourth section. Conclusions and suggestions for future research are provided at the end of the study.

Literature Review

Imports help stimulate economic growth through several different channels. They are a source of technology transfers and new ideas. They promote innovation among domestic firms through import competition. They also provide factors of production that are used in both domestic production and export sectors. Given the latter, it is no surprise that an expansion of imports can frequently spur an expansion of exports (Coe and Helpman, 1995).

Prior studies have often examined the role of exports as a means for economic growth, to the exclusion of the role of imports, which have led to misleading or perhaps biased conclusions in favor of either export-led growth (ELG) or growth-led export (GLE) hypotheses. Empirical evidence indicates this is because spurious results may occur when analyzing a system without including imports in Granger causality tests (Awokuse, 2008). It is clear that exports can be a catalyst for economic growth, but this does not mean that an export-led growth strategy should take precedence over an import-led growth strategy. That is because, both imports and exports are equally important for an outer-oriented economic strategy (Thangavelu and Rajaguru, 2004).

For transitional European countries, Awokuse (2007) concludes that imports stimulate economic growth just as much as exports. Awokuse (2008) reports similar results for Latin American countries. Evidence in those studies indicates that for an export promotion strategy to work effectively, it must also be combined with an equally effective import promotion strategy. That is at least partially because imports facilitate export strategies by supplying critical production

inputs. In many of the countries tested, imports are found to generate larger effects on growth than exports.

In developing countries, per-capita income growth rates are often higher for countries that import more capital goods for the production of capital stock relative to the ratio of domestically produced capital goods for investment (Lee, 1995). Growth in the long run can be achieved by accumulating inputs that will provide positive externalities. In addition, endogenous growth models relying on imports indicate that goods and services from abroad can help sustain long-run economic expansion (Grossmann and Helpman, 1994). Imports seemingly provide a virtuous link between trade and output growth for many regions (Thangavelu and Rajaguru, 2004).

Theoretical Framework and Data

To examine the empirical relationship between trade and economic growth for Mexico, an integrated framework focusing on the roles of exports and imports is employed. Doing so requires allowing for system dynamics to be accommodated. One possible approach is vector error correction modeling that can account for long-run and short-run relationships between exports, imports, and GDP (Awokuse, 2008).

The traditional neoclassical growth model has been augmented with exports and imports added to the aggregate production function (Balassa, 1978; Sheehey, 1992; Awokuse, 2008). To test their respective effects on growth in Mexico, the implicit production function associated with such an approach can be expressed as shown in Equation (1):

$$Y \; = \; F\,[(K, L); X, M]\,, \tag{1}$$

where Y is real GDP; K is a real gross capital formation proxy for capital; L is the labor force; X is real exports; and M is real imports. If stationary components of the sample variables are cointegrated, a vector error correction model (VECM) can be utilized to model systems in which multiple variable linkages are considered (Kao, 1999). A simplified VECM system for GDP, exports, and imports, only, is given by:

$$\Delta Y_t = \mu_1 + \alpha_{11}\xi_{1t-1} + \alpha_{12}\xi_{2t-1} + \alpha_{13}\xi_{3t-1} + \sum_{j=1}^{p-1}\phi_{1j}\Delta Y_{t-j} + \sum_{j=1}^{p-1}\theta_{1j}\Delta X_{t-j} + \sum_{j=1}^{p-1}\psi_{1j}\Delta M_{t-j} + \varepsilon_{1t} \tag{2}$$

$$\Delta X_t = \mu_2 + \alpha_{21}\xi_{1t-1} + \alpha_{22}\xi_{2t-1} + \alpha_{23}\xi_{3t-1} + \sum_{j=1}^{p-1}\phi_{2j}\Delta Y_{t-j} + \sum_{j=1}^{p-1}\theta_{2j}\Delta X_{t-j} + \sum_{j=1}^{p-1}\psi_{2j}\Delta M_{t-j} + \varepsilon_{2t} \tag{3}$$

$$\Delta M_t = \mu_3 + \alpha_{31}\xi_{1t-1} + \alpha_{32}\xi_{2t-1} + \alpha_{33}\xi_{3t-1} + \sum_{j=1}^{p-1}\phi_{3j}\Delta Y_{t-j} + \sum_{j=1}^{p-1}\theta_{3j}\Delta X_{t-j} + \sum_{j=1}^{p-1}\psi_{3j}\Delta M_{t-j} + \varepsilon_{3t} \tag{4}$$

In the above VECM framework, ΔY_t, ΔX_t, and ΔM_t are influenced by long term error correction terms (ξ_{1t-1}) and short-term (differenced) lags of variables of Y_{t-j}, X_{t-j}, and M_{t-j}.

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The natural question that emerges regarding the above sets of approaches is which one should be employed? If the stationary components of the sample variables are cointegrated, then a VECM framework is appropriate (Kao, 1999). If they are not, then a VAR approach is recommended. Testing is carried out below to determine which method should be applied.

Annual frequency data employed for the study are primarily from the World Development Indicators of the World Bank. The sample period is 1960-2007 and the series are measured in real US$ with 2000 as the base year. All variables are transformed using natural logarithms. In all, the sample contains 48 historical observations for all but one series. The exception, due to missing observations, is the labor-force variable.

That variable is collected from four different sources. More than half of the labor force data, 1980-2007, are taken directly from the World Development Indicators of the World Bank. Estimates for 1974-1979 are obtained from the International Labour Office Laborsta data bank. Historical observations for 1960 and 1970 are from the Instituto Nacional de Estadística y Geografía (INEGI) decennial censuses for Mexico. Two sets of missing observations, for the years 1961-1969 and 1971-1973, are interpolated by separately using real GDP and population patterns applied to the labor-force variable (Friedman, 1962; Fernandez, 1981). A simple average of both fitted series yields the generated labor-force estimates for the missing twelve observations.

Empirical Analysis and Results

To investigate the issue of growth dynamics in Mexico, a VEC model is also estimated (Awokuse, 2008; Thangavelu and Rajaguru, 2004). A VEC model allows for dynamic time series properties and permits examining short-run and long-run causal patterns. To avoid spurious results in the VEC model, both unit root tests and cointegration tests are applied. For the unit root tests, a null hypothesis of non-stationarity is utilized (Dickey and Fuller, 1979), and a test for a null hypothesis of stationarity is also deployed (Kwiatkowski et al., 1992). The combination of both tests provides a robust technique for exposing the presence of unit roots (Awokuse, 2008). Unit root tests indicate that the variables are integrated after first differencing at order one and that cointegrating relationships may exist among the variables.

To establish the number of cointegrating vectors, eigenvalue and trace tests are conducted. Results from both tests indicate that there are cointegrating relationships among the variables and that they are integrated at order one, implying that the VEC specification is appropriate and will not produce spurious regressions. Lagrange multiplier tests further indicate that the VEC model does not suffer from autocorrelation and that the model is properly specified.

Table 1 About Here

Table 1 summarizes results from the VEC cointegrating equations. Similar to Ibarra (2010), the results fail to support the ELG hypothesis. The ILG hypothesis is, however, supported. It is difficult, however, to determine causality by direct observation of the estimated coefficients in

any VEC model. Granger causality Wald tests based on the VEC model are conducted to shed further light on the direction of causality (Granger, 1969).

Table 2 reports the results of Granger causality Wald tests. Each column represents a VEC equation for each of the five variables in the system. The Granger causality Wald results are given as the p-values. The values in brackets represent the z-statistics for the error-correction terms for each cointegration equation. The significant z-statistics indicate long-run causality and significant p-values indicate short-run causality.

Table 2 About Here

In the VEC model, exports are not found to Granger cause GDP and GDP is found not to Granger cause exports. Imports are found to Granger cause GDP, but GDP is found to not Granger cause imports. The respective error-correction terms (z-statistics) of imports and GDP are significant, indicating that long-run causal relationships exist between them. The results of the VEC model imply that the hypotheses of ELG and GLE do not hold for Mexico, but the ILG hypothesis is found to be valid for Mexico. The findings are consistent with Awokuse (2008) and Thangavelu and Rajaguru (2004) and add to the growing body of international evidence in favor of the ILG development hypothesis.

Conclusion

The impact of international trade on macroeconomic performance is a subject of continuing debate. Recent empirical studies for a variety of developing economies indicate that, contrary to widely held assumptions, imports tend to spur growth. This study examines the potential linkages between trade and growth for Mexico. The empirical analyses are carried out within a dynamic context and also consider direction of causality. In the VEC model, the ILG hypothesis is supported with evidence of unidirectional causality from imports and GDP. The empirical evidence generated for Mexico in these exercises, thus, tends to support the ILG hypothesis in accordance with the dynamic estimates reported for other international economies.

Aside from the evidence reported for other countries, the results obtained here are fairly logical. Imports can help foster economic growth because they are a source of technology transfers; they promote innovation through import competition; and they provide factors of production, which are used in both domestic and export sectors. The results of the paper lend credence to policies implemented in Mexico that continue to deregulate international commerce.

Liberalized trading regimes represent only one facet of market-oriented structural reforms. Another question yet to be answered for Mexico is whether other reform measures can bolster economic performance further. Potential topics to consider along those lines include labor code reforms and business registry practices. Global estimates along these lines indicate that fairly impressive income gains may result from easing these types of regulatory burdens (Licerio, Fullerton, and Clark, 2010).

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Table 1. Vector Error-Correction Model

Dependent Variable:	GDP			
Sample:	1963-2007			
Included	Observations:	45		

Variable	Coef.	Std.Err.	z	P>|z|
Exports	-0.5112	0.1342	-3.81	0.000*
Imports	0.4159	0.1006	4.14	0.000*
Capital	-0.4390	0.1452	-3.02	0.003*
Labor Force	1.0341	0.5186	1.99	0.046*
Constant	-0.0368	-	-	-

Cointegrating	Equations		
Equation	Parameters	chi2	P>chi2
CE1	4	33.3586	0.0000

Log likelihood	417.4962	AIC	-16.8221
		HQIC	-16.2384
Det(Sigma_ml)	6.01e-15	SBIC	-15.2563

Notes:

Identification: the parameter vector is exactly identified and the Johansen normalization restriction is imposed.

All data are logarithmically transformed and differenced prior to estimation.

* denotes coefficient statistical significance at 5-percent level.

Table 2. Granger Causality Test Results Based on VEC Model

Dependent	Exports	Imports	Capital	GDP	Labor Force
z-statistics	[2.33]*	[-5.26]*	[-3.27]*	[-2.78]*	[-1.62]
Independent					
Exports	–	0.1108*	0.0963	0.0958	0.14
Imports	0.1667	–	0.0047*	0.0385*	0.3967
Capital	0.6458	0.0597	–	0.4254	0.7918
GDP	0.4243	0.3815	0.6335	–	0.7556
Labor Force	0.0220*	0.0033*	0.0305*	0.0329*	–

Notes:

Ho: endogenous variables do not Granger cause the dependent variable.

Values in brackets are estimated z-statistics for each cointegration equation.

All other values represent p-values.

* denotes statistical significance at 5-percent level.