THE PHILIPPINE REVIEW OF ECONOMICS
Vol. L No. 1, June 2013 pp. 83–110

An empirical analysis of the export-led growth (ELG) hypothesis in the Philippines

Richard Emerson D. Ballester
National Economic and Development Authority (NEDA)

Joy F. Sinay
National Economic and Development Authority (NEDA)

We reexamine the relationship between growth and exports of the Philippines for the period 1977–2009 using the methods of Sharma and Panagiotidis [2005] and Feder [1983]. With the shift in the current economic policy toward inclusive growth, we find it necessary to assess if indeed the export-led growth (ELG) hypothesis really worked for the country. Specifically, our research investigates the cointegration of exports, imports, and output using the Johansen cointegration test and the Breitung cointegration test; the Granger-causality between exports, investments, and output; and the impact of macroeconomic shocks by employing a vector autoregressive model. In summary, we find that the ELG hypothesis appears to be empirically unsupported for the Philippine case.

JEL classification: E20, F10, F41, O11, O24
Keywords: export-led growth hypothesis, Breitung cointegration test, vector autoregressive model

1. Introduction

The export-led growth (ELG) strategy is considered one of the main reasons for the growth of developing countries in East Asia in the 1990s. ELG promotes export-oriented industries in order to fuel domestic growth. It is based on the theory of comparative advantage, wherein countries

have gains from trade when they produce goods where they have a more efficient production. Exporting these goods and importing the goods where they have less efficiency from countries who can produce these goods more efficiently lead to gains from trade and thus to higher economic growth. The ELG strategy follows the implementation of the import-substitution policies in the 1960s. Import substitution, in contrast to ELG, pushes for the growth of domestic production by supporting local industries and regulating the importation of foreign goods.

Following the trend, the Philippines implemented import-substitution policies in the 1960s. Unfortunately, these policies failed to fuel growth vis-à-vis those of other neighboring countries. In the early 1970s, the ELG strategy was implemented. Exports gradually increased, and from an average of PHP 56 billion in 1961–1970, it reached PHP 556 billion in 2001–2009. During these periods, however, average exports growth was higher in 1961–1970 at 5.5 percent per year, compared with 3.2 percent per year in 2001–2009. (See Appendix A for the graph.)

In 1991, the Philippines adopted the Foreign Investment Act (Republic Act 7042), allowing foreign ownership of up to 100 percent.[1] Foreign ownership is a vital factor in investment decisions. Investors are attracted to areas where they can have a majority stake in their investments, than to those where they are only a minority owner. Allowing foreign ownership means that the country has adopted a more liberal policy toward investments. Exports processing zones and special economic zones were also established, and corporations in these zones were granted special incentives under the Omnibus Investment Code [Austria 2003].

The liberalization of investments supported the trade policy on promoting exports. Looking at national accounts data on expenditures, there is an increase in the contribution of exports to growth in the 1990s. Data show that in the 1960s and 1970s, domestic demand had the highest share to the growth of the gross domestic product (GDP), while exports was a minor contributor. In the 1990s, the share of exports increased, and in some years it was even higher than the contribution of domestic demand. With the growth of exports, there is also an increase in imports, such that the larger share of exports corresponds to a larger contribution of imports to growth. (See Appendix A for the graph.)

[1] Foreign ownership of 100 percent is for areas not in the Foreign Investment Negative List. These are areas specified by the constitution, those related to defense, risk to health and morals, and small and medium enterprises.

The export-led growth hypothesis, however, has been criticized due to conflicting results of studies on the impact of exports growth on overall growth. Although higher GDP growth corresponds with the higher growth in exports, a direct causation for the adoption of the export-led strategy with higher economic growth cannot be explicitly established. Exports positively contribute to the economy through their impact on technology, investments, competitiveness, productivity, and opportunities for growth. However, other factors may also be causing the economic growth during the period of implementation of the ELG strategy. One of these factors could be imports, which also rises with the increase in exports. Like exports, imports brings new technology and enhances productivity and competitiveness.

Our paper looks into the case of the Philippines to determine if the export-led growth strategy was a main factor for the country's economic growth. The study examines the linkages between exports growth and economic growth using the methodology of Sharma and Panagiotidis [2005]. This is an improved version of the method developed by Feder [1983] in his seminal paper on ELG. The paper starts with a discussion on exports and GDP, followed by a review of literature on ELG and trade. The methodology is then presented together with the results. In the last part is the conclusion.

2. Related literature

Felipe and Lim [2005] describe export-led growth as a high GDP growth and high income growth, with high exports growth that is higher than imports growth. Based on growth accounting, they found that for the Philippines, growth after the 1997 Asian financial crisis was not based on the ELG strategy. During this period domestic demand improved, although its contribution to GDP was declining. Moreover, net exports declined, although its negative contribution to GDP improved.

In another study, Felipe [2003] looks into the relevance of ELG for developing countries in Asia. He concludes that it is not overall exports that drives growth, but the composition. Exports do not necessarily fuel economic growth. Exporting the right goods and services matters more. Demand from developed countries also has a significant impact on exports, and thus is also important.

Meanwhile, Kim, Lim, and Park [2007] examine Korea and find that imports affect productivity and growth, while exports have no significant impact. They posit that imports increase competition in the domestic economy and induce local producers to improve productivity. This builds up competitiveness for both the domestic and foreign markets, and drives exports and economic growth. Similarly, Yang [2008] shows that the parallel growth between GDP and exports is not necessarily a result of a direct causality between the two. Mostly, GDP growth comes about with the improvement in productivity in the nontradable sector, not in the exports sector.

For the three BIMP-EAGA[2] countries (Indonesia, Malaysia, and the Philippines), Furuoka [2007] finds that ELG does not apply. Using panel data, he discovers that it is GDP that drives exports, and that the two variables do not move together in the long run. He presumes that private consumption and/or government spending may be driving growth, hence the absence of cointegration between the exports and GDP. Meanwhile, Amrinto and Zapata [2006] find that for the Philippines, there is a long-run relationship between GDP, exports, investments, and real interest rates. Using parametric and semiparametric methods on both annual and quarterly data, they see that there is a two-way causality between exports and GDP in the quarterly data, while the annual data do not show this. However, they argue that quarterly data are more effective since the number of observations is higher and seasonality is included.

Looking at the role of macroeconomic policy in the context of an ELG strategy, Lin, Lee, and Huang [1996] argue that industrial policy comes before macroeconomic policy when a country adopts export promotion as the main growth strategy. Price stability then becomes secondary and fiscal policy is more relevant. When exports then weaken and the government focuses on economic and social stability, government spending becomes the main policy instrument.

[2] Brunei Darussalam–Indonesia–Malaysia–Philippines East ASEAN Growth Area.

3. Theoretical framework

The ELG rests on the idea that exports growth is a one of the key determinants of output growth. According to Sharma and Panagiotidis [2005], output growth mainly benefits export growth via nonexports through upgraded production methods, substantial cost reduction, development of comparative advantage, and improved managerial styles. However, when policies favor the substantial inflow of investments and technology, the marginal factor productivity of the exports sector is expected to be higher than that of the other sectors of the economy. The expansion of exports, therefore, even at the cost of the other sectors, is projected to provide a net positive spillover in the entire economy.

One of the major problems encountered in examining the impact of exports on growth lies in the fact that exports are a component of national income. Obviously, any model that does not account for this property suffers from reverse causality. It is for this reason that we are using the model of Feder [1983].

Feder's [1983] method divides the economy into export and nonexport sectors:

$$\dot{Y} = \dot{X} + \dot{N} \tag{1}$$

where Y is GDP, X is exports, and N is GDP net of exports (nonexports). Exports are a function of labor and capital, and nonexports are a function of labor, capital, and exports. This framework takes into account are externalities from the exports sector that are incorporated into the nonexports sector. Sharma and Panagioditis [2005] represent this as

$$\dot{Y} = \alpha\dot{X} + (1 - \alpha)\dot{N} \tag{2}$$

where α is X/Y and $(1 - \alpha)$ is N/Y. The relationship between GDP and exports is defined by

$$\dot{Y} = \alpha_0 + \alpha_1 \dot{X} + u. \tag{3}$$

In general, with substitution,

$$(1 - \alpha)\,\dot{N} = \alpha_0 + bX + cZ + \varepsilon \tag{4}$$

where Z is the vector of additional determinants of output. Appendix E shows the graphical illustration of the GDP net of exports based on Feder's approach.

4. Data and methodology

Our data are taken from the National Income Accounts (NIA), which is generated by the National Statistical Coordination Board (NSCB); the balance-of-payments (BOP) account, which relies on the foreign trade statistics of the National Statistics Office (NSO); and the Labor Force Survey (LFS) of the NSO. Exports, including imports, can be found both in the NIA and the BOP. We prefer to use the latter since it is less frequently used in the study. Further, the export data from the BOP have not yet been converted to the national accounts, hence retaining original properties, which are actually more desirable in the analysis.

Spanning a period of 33 years, or 132 quarters, from 1977 to 2009, the following are the time series used in this paper:

a. GDP: gross domestic product
b. N_FEDER: GDP net of exports (using Feder's method)
c. RGDCF: gross domestic capital formation
d. RMBOP: imports
e. RXBOP: exports
f. EMPWS: level of employment under the wages and salaries category
g. POP: population
h. DUMCRISIS: dummy for all the crises

The data are in real values except for the employment and population figures. A prefix "L" in the variable name represents the natural logarithmic transformation of the data, and "D" denotes that the variable is first differenced. The first differences are given graphically in Appendix B while the summary statistics and cross-correlations are provided in Appendices C and D, respectively. It is interesting to note that the N_FEDER is negatively correlated to all the other variables concerned. In addition, our estimations are conducted using EViews 7.1 and EasyReg International.

Our methodology is sourced from the work of Sharma and Panagiotidis [2005] covering the (a) unit root tests, (b) Johansen cointegration test, (c) Breitung cointegration test, (d) Granger-causality test, (e) vector

autoregressive (VAR) estimation, and (f) the impulse response functions (IRFs).

5. Estimation results and discussion

5.1. Unit roots and cointegration

We test if the variables have unit roots using the augmented Dicker-Fuller (ADF) test and the Phillips-Perron (PP) test. The suitable equation test for each variable is chosen based on each plot. We include a constant in the equation if the series seems to be wandering or fluctuating around a nonzero sample average, while we considered the trend and intercept in the equation if the series appears to be fluctuating around a linear trend. We present our test results in Table 1, confirming that the time series in both the annual and quarterly data are indeed I(1). The lag length for the ADF test is based on the Schwartz information criterion. The PP test uses the Newey-West bandwidth with the Bartlett kernel as the spectral estimation method.

Table 1a. Unit root tests (annual)

Variables (in log)	Level		First differences	
	ADF test statistic	PP test statistic	ADF test statistic	PP test statistic
GDP	-2.47	-0.92	-4.01	-3.02
GDP without exports	-2.23	-2.23	-5.67	-5.68
Exports	-1.80	-2.04	-3.75	-3.75
Imports	-1.67	-1.95	-3.55	-3.57
Investments	-1.83	-1.42	-5.18	-4.55
Employment	0.57	1.82	-6.20	-6.89
Population	-1.32	-1.40	-5.37	-5.37
CRITICAL VALUES (TREND AND INTERCEPT)				
1%	-4.26	-4.26	-4.26	-4.26
5%	-3.55	-3.55	-3.55	-3.55
10%	-3.21	-3.21	-3.21	-3.21
CRITICAL VALUES (INTERCEPT)				
1%	-3.65	-3.65	-3.66	-3.66
5%	-2.96	-2.96	-2.96	-2.96
10%	-2.62	-2.62	-2.62	-2.62

Table 1b. Unit root tests (quarterly)

Variables (in log)	Level		First differences	
	ADF test statistic	PP test statistic	ADF test statistic	PP Ttest statistic
GDP	-2.17	-1.43	-3.08	-3.74
GDP without exports	-2.15	-2.07	-3.96	-5.62
Exports	-3.25	-2.37	-3.23	-10.81
Imports	-1.77	-2.02	-8.83	-9.23
Investments	-3.22	-4.30	-5.39	-17.69
Employment	-3.33	-4.47	-15.85	-18.47
Population	-1.96	-1.21	-2.73	-5.50
CRITICAL VALUES (TREND AND INTERCEPT)				
1%	-4.035	-4.030	-4.035	-4.030
5%	-3.447	-3.444	-3.447	-3.445
10%	-3.149	-3.147	-3.149	-3.147
CRITICAL VALUES (INTERCEPT)				
1%	-3.485	-3.481	-3.485	-3.481
5%	-2.885	-2.884	-2.885	-2.883
10%	-2.579	-2.579	-2.579	-2.579

Cointegration implies that variables share similar stochastic trends and, since the difference of the residual is stationary, they never deviate too much from each other. Our next step is to know if cointegration exists between exports, output, and imports. Researchers suggest the inclusion of imports in exploring the causality between exports and growth, as it appears to eliminate bias. Moreover, the strong structural link between exports and imports in the Philippines necessitates the addition of imports in the hypothesis test. The cointegration hypothesis in the first group consists of exports, output, and imports. In the second group, we consider exports, imports, and output less of exports, from Feder's method.

Table 2a. Johansen cointegration test [LGDP, LRXBOP, LRMBOP] (annual)

r	Eigenvalue	Trace statistic	5% CV	Prob.**	Max. Eigenstatistic	5% CV	Prob.**
None	0.331203	20.88884	29.79707	0.3646	12.06823	21.13162	0.5409
At most 1	0.232524	8.820613	15.49471	0.3822	7.939452	14.2646	0.3849
At most 2	0.028945	0.881161	3.841466	0.3479	0.881161	3.841466	0.3479

**MacKinnon-Haug-Michelis [1999] p-values.
Trace test and max eigen value test indicate no cointegration at the 0.05.

Table 2b. Johansen cointegration test [LGDP, LRXBOP, LRMBOP] (quarterly)

r	Eigenvalue	Trace statistic	5% CV	Prob.**	Max. eigenstatistic	5% CV	Prob.**
None	0.067236	17.65615	29.79707	0.5915	8.839650	21.13162	0.8452
At most 1	0.055674	8.816496	15.49471	0.3826	7.275003	14.2646	0.4571
At most 2	0.012064	1.541493	3.841466	0.2144	1.541493	3.841466	0.2144

**MacKinnon-Haug-Michelis [1999] p-values.

Trace test and max eigen value test indicate no cointegration at the 0.05.

Table 3a. Johansen cointegration test [ln(GDP less X), ln(Exports, ln(Imports)] (annual)

R	Eigenvalue	Trace statistic	5% CV	Prob.**	Max. eigenstatistic	5% CV	Prob.**
None	0.445406	31.2725	29.79707	0.0336	17.68557	21.13162	0.1421
At most 1	0.327441	13.58693	15.49471	0.095	11.89995	14.2646	0.1145
At most 2	0.054681	1.686978	3.841466	0.194	1.686978	3.841466	0.194

**MacKinnon-Haug-Michelis [1999] p-values.

Trace test and max eigen value test indicate no cointegration at the 0.05.

Table 3b. Johansen cointegration test [ln(GDP less X), ln(Exports, ln(Imports)] (quarterly)

R	Eigenvalue	Trace statistic	5% CV	Prob.**	Max. eigenstatistic	5% CV	Prob.**
None	0.106533	25.72800	29.79707	0.1371	14.30605	21.13162	.3404
At most 1	0.053890	11.42194	15.49471	0.1868	7.035307	14.2646	.4850
At most 2	0.033951	4.386634	3.841466	0.0362	4.386634	3.841466	.0362

**MacKinnon-Haug-Michelis [1999] p-values.

Trace test and max eigen value test indicate no cointegration at the 0.05.

The results for the first group and the second group are given in Table 2 and Table 3, respectively. Both results demonstrate that we cannot reject the null hypothesis of no cointegration at the 5 percent level of significance. In other words, there is no fundamental relationship existing between exports and output. It suggests that trade policy, specifically the export policy of the Philippines, appears ineffective in boosting growth. Hence, the ELG hypothesis for the Philippines is empirically unsupported both in the annual and quarterly data.

However, the Johansen cointegration test is known for shortcomings such as the nuisance and structural parameters estimation. To remedy this, we utilize an alternative nonparametric cointegration test introduced by

Breitung [2002] to confirm our results. Unlike the Johansen cointegration test, Breitung's nonparametric cointegration test does not need the deterministic trend assumption and the lag intervals.

Breitung [2002] laid down his ideas in the following manner:

Let $y(t)$, t=1,...,n, be a three-dimensional unit root process:

$$y(t) = y(t-1) + m + u(t) \tag{5}$$

where $u(t)$ is a zero-mean stationary three-dimensional time series process, and m is a three-dimensional vector of drift parameters.

If $m = 0$ (no drift), let $z(t)$ be the demeaned vector time series $y(t)$, else let $z(t)$ be the detrended vector time series $y(t)$. When we compute the partial sums, this will result in

$$Z(t) = z(1) + z(2) + ... + z(t) \tag{6}$$

and then the matrices

$$A = Z(1)Z(1)' + Z(2)Z(2)' + ... + Z(n)Z(n)' \tag{7}$$
$$B = z(1)z(1)' + z(2)z(2)' + ... + z(n)z(n)' \tag{8}$$

Let $c(1), c(2), c(3)$ be the increasingly ordered generalized eigenvalues of A with respect to B. If $y(t)$ is cointegrated with cointegration rank r, then $(n^2)*[c(1)+ ... +c(3-r)]$ converges in distribution to a function of a standard Wiener process, which is free of nuisance parameters, whereas for $k > 3-r$, $(n^2)\ c(k)$ converges to infinity. Thus, the Breitung test is conducted right-sided, starting from the null hypothesis $r = 0$. The cointegration rank r corresponds to the first accepted null hypothesis. If none is accepted the cointegration rank is $r = 3$, which implies that $y(t)$ is (trend) stationary. We define $y(t,1)$ = LN_FEDER, $y(t,2)$ = LRMBOP and $y(t,3)$ = LRXBOP.

Our results are given in Table 4 and Table 5. The simulations are those with drift based on the plots of $y(t)$ and 10000 replications of Gaussian random walks with length n = 33 (annual) and n =132 (quarterly). Note that the values obtained undoubtedly reject the idea that exports and GDP are cointegrated, for both annual and quarterly data. The Breitung test results show that the ELG hypothesis is also not empirically supported.

Table 4a. Breitung cointegration test [LGDP, LRXBOP, LRMBOP] (annual)

H0	H1	Test statistic	10% CV	5% CV	Simulated-p-values
r=0	r>0	514.17	1158	1330	0.8325
r=1	r>1	169.72	596.2	713.3	0.9575
r=2	r>2	47.85	222.4	281.1	0.9689
Conclusion			r=0		

Table 4b. Breitung cointegration test [ln(GDP), ln(Exports, ln(Imports)] (quarterly)

H0	H1	Test statistic	10% CV	5% CV	Simulated-p-values
r=0	r>0	694.69	1158	1330	0.54840
r=1	r>1	171.05	596.2	713.3	0.95850
r=2	r>2	46.42	222.4	281.1	0.98020
Conclusion			r=0		

Table 5a. Breitung cointegration test [LN_FEDER, LRXBOP, LRMBOP] (annual)

H0	H1	Test statistic	10% CV	5% CV	Simulated-p-values
r=0	r>0	699.82	1158	1330	0.4502
r=1	r.>1	183.04	596.2	713.3	0.9275
r=2	r>2	65.12	222.4	281.1	0.7638
Conclusion			r=0		

Table 5b. Breitung cointegration test [ln(GDP less X), ln(Exports, ln(Imports)] (quarterly)

H0	H1	Test statistic	10% CV	5% CV	Simulated-p-values
r=0	r>0	750.4	1158	1330	0.46070
r=1	r>1	250.4	596.2	713.3	0.72990
r=2	r>2	82.2	222.4	281.1	0.62320
Conclusion			r=0		

5.2. Granger causality test

To further determine whether exports stimulate growth, we conduct the Granger causality test between (a) GDP and exports, (b) GDP net of exports and exports, and (c) between exports and investments. The Granger causality test answers the question as to whether x Granger-causes y or if x helps in the prediction of y. We use two lags in the estimation process in the annual and quarterly data.

Table 6.a Pairwise Granger causality tests: GDP without exports (annual)

Sample: 1977 2009			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
DLRXBOP does not Granger-cause DLN_FEDER	30	0.21045	0.8116
DLN_FEDER does not Granger-cause DLRXBOP		1.90126	0.1704

Table 6.b Pairwise Granger causality tests: GDP without exports (quarterly)

Sample: 1977Q1 2009Q4			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
DLRXBOP does not Granger-cause DLN_FEDER	129	0.29227	0.7471
DLN_FEDER does not Granger-cause DLRXBOP		0.92648	0.3987

Table 7.a Pairwise Granger causality tests: GDP (annual)

Sample: 1977 2009			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
DLRXBOP does not Granger-cause DLRGDP	30	0.54008	0.5894
DLRGDP does not Granger-cause DLRXBOP		0.40959	0.6683

Table 7.b Pairwise Granger causality tests: GDP (quarterly)

Sample: 1977Q1 2009Q4			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
DLRXBOP does not Granger-cause DLRGDP	129	0.51205	0.0002
DLRGDP does not Granger-cause DLRXBOP		9.07709	0.6005

Table 8.a Pairwise Granger causality tests: investment (annual)

Sample: 1977 2009			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
DLRXBOP does not Granger-cause DLRGDCF	30	1.45735	0.252
DLRGDCF does not Granger-cause DLRXBOP		0.98425	0.3877

Table 8.b Pairwise Granger causality tests: investment (quarterly)

Sample: 1977Q1 2009Q4			
Lags: 2			
Null hypothesis:	Obs	F-Statistic	Prob.
DLRXBOP does not Granger-cause DLRGDCF	129	10.7568	0.000
DLRGDCF does not Granger-cause DLRXBOP		13.4722	0.000

While we are looking for the Granger-causality between exports and output, it is important to consider investments since it is key to the exports sector, as implied in the Rybczynski theorem. On the other hand, exports can bolster investment if we assume that there exists a possible productivity gap between the exports and nonexports sectors.

The results are shown in Tables 6, 7, and 8. We find that for annual data, exports does not Granger-cause GDP and vice versa. This result is also true between exports and GDP net of exports. Similarly, investments do not Granger-cause exports, and neither do exports Granger-cause investments. For quarterly data, the estimates show that exports Granger-cause GDP, and is two-way for exports and investments. However, we noted that exports does not Granger-cause the GDP derived from Feder's method. Hence, in general, the ELG hypothesis is seen untenable for the Philippines case.

5.3. Vector autoregressive model (VAR) and the impulse response functions

To investigate the causal relationship of the variables, we take into account their dynamic properties by using a VAR equation. We use GDP net of exports, investments, and exports as the endogenous variables with the constant, employment, population, and imports as the exogenous variables. To account for all the crises that hit the country in the quarterly data, a dummy variable is introduced. The lag length is based on the Akaike information criterion (AIC). We find no serial correlation of the VAR equation LM when we use the serial correlation test at the 1 percent significance level. Appendix F shows our VAR estimates.

To analyze the dynamic path of the variables in response to a one-time shock, we utilize the IRFs. The results of our estimation are shown in Figures 1 and 2. Figure 1 shows the detailed graphs while Figure 2 is the set of combined graphs. If we look at Figure 1a, when a shock is introduced to GDP, we observe a very weak positive response in investment and exports for the first three years, and this dies out in the fourth year. When a shock is introduced to investment, we note a trivial hump-shaped response from output and an insignificant response from exports. Similarly, we get a lackluster response from output and investment when the shock is introduced to exports. In Figure 1b, the IRFs tell almost the same story obtained in the annual data. A shock in exports yields almost a nil response from output and a sluggish reaction from investments. Meanwhile, exports and investments have negligible responses on a shock originating from output. Also noticeable are the weak responses of investments and exports

from a shock originating from investments. Summing up, the validity of the ELG hypothesis for the Philippines is once again put into question.

Figure 1a. Individual graphs of the impulse response functions (annual)

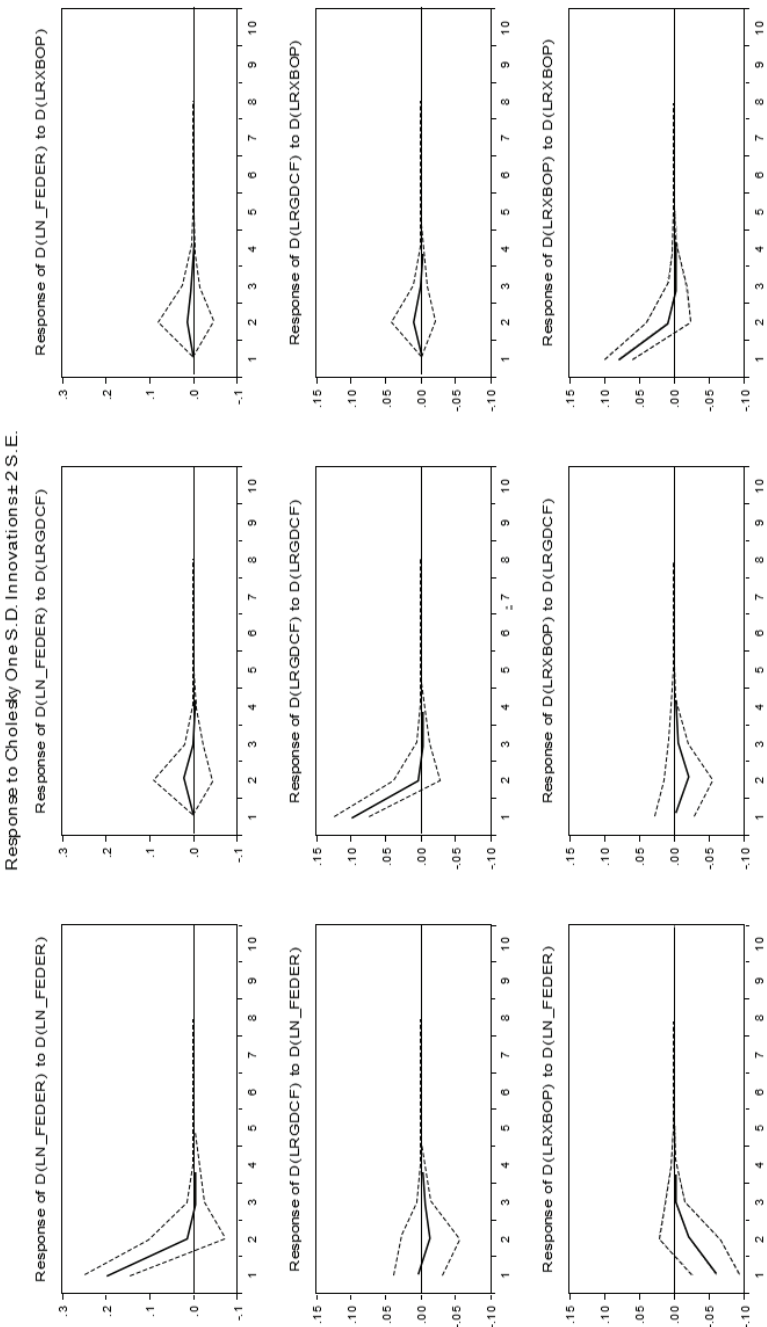


Figure 1b. Individual graphs of the impulse response functions (quarterly)

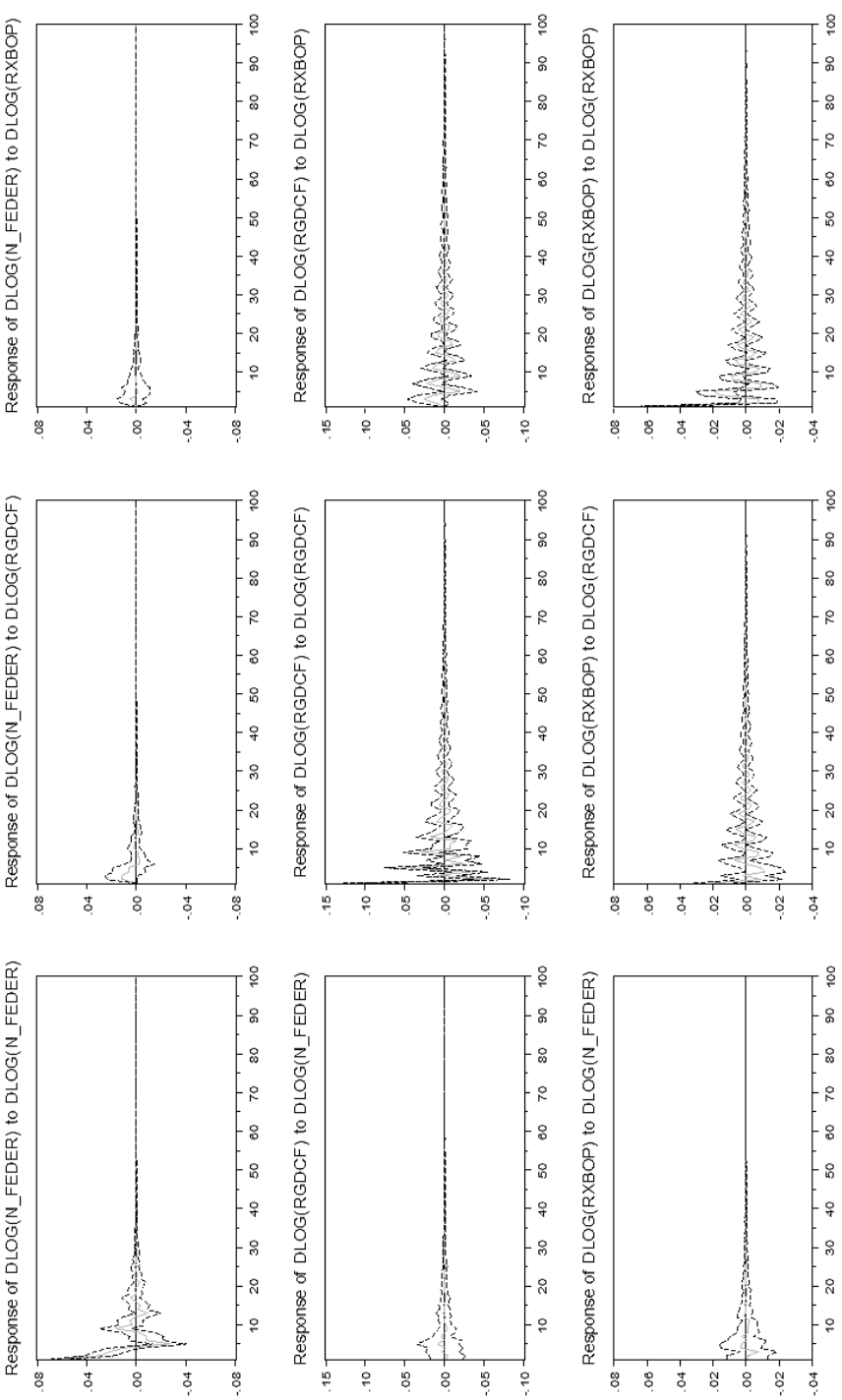


Figure 2a. Combined graphs of the impulse response functions (annual)

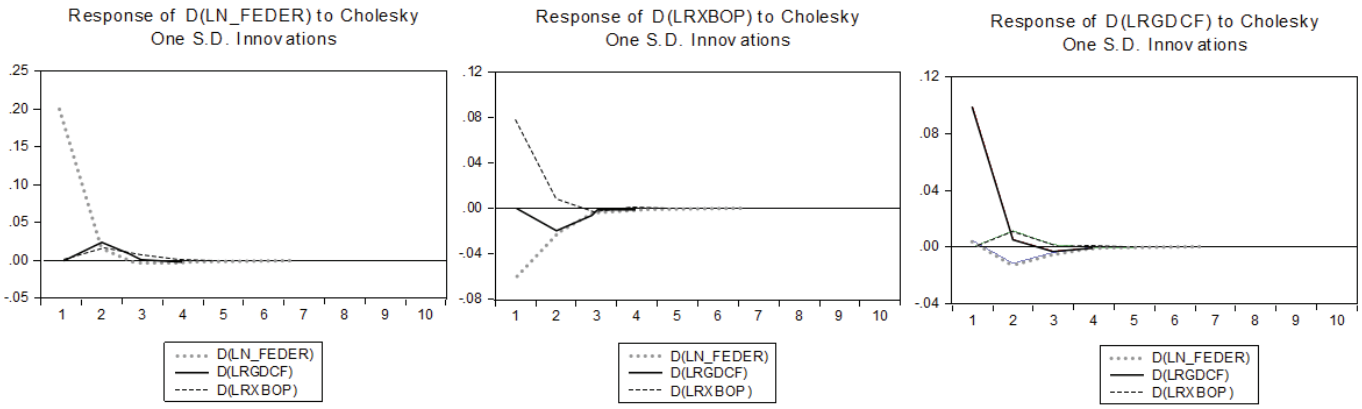
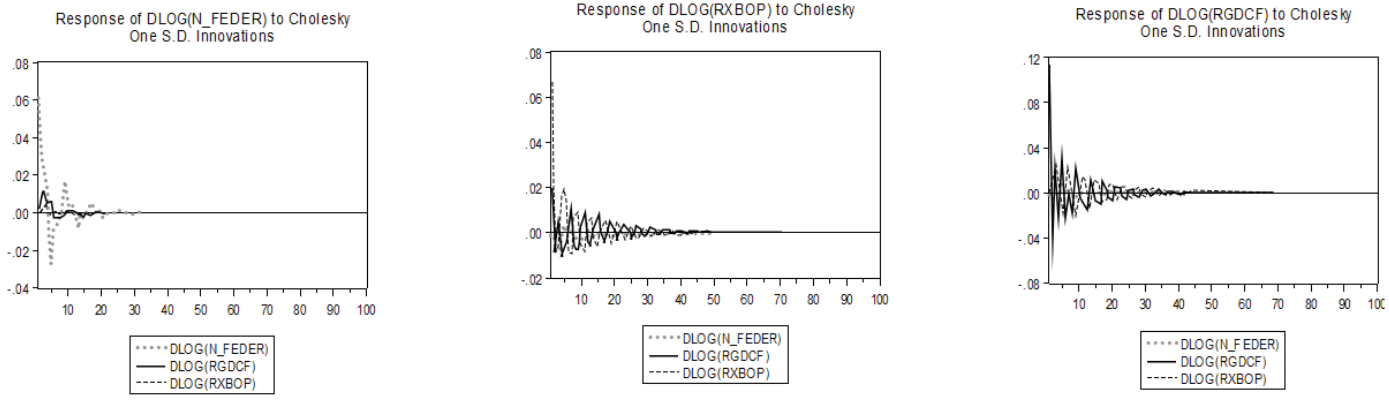


Figure 2b. Combined graphs of the impulse response functions (quarterly)



6. Conclusion

In this research, we investigate the empirical validity of the ELG hypothesis for the Philippines. The study covers a period of three decades from 1977 to 2009, which we believe is able to capture the liberalization of exports, given that the trade liberalization began in the early 1970s. Using the methodology of Sharma and Panagiotidis [2005], we do empirical tests for (a) cointegration of exports, imports, and output using the Johansen cointegration test and the Breitung cointegration test; (b) Granger-causality between exports, investments, and output; and (c) the impact of macroeconomic shocks by employing a VAR model. We test both the annual and quarterly data. In general, the results reject the assumptions of cointegration and causality, and strongly suggest that the ELG hypothesis is empirically untenable for the case of the Philippines. The IRFs, in particular, appear to unveil the structural weaknesses of the exports sector and its fragile links to the domestic economy. One reason could be that exports comprises only 40–50 percent of total GDP. Household consumption takes a much larger share of 70–80 percent, and also has the highest contribution to growth over the period. Thus, the linkages between exports and growth could be undermined by the distribution of expenditures, particularly the large share of consumption to GDP [Furuoka 2007].

We believe the introduction of the Breitung cointegration test in our study is a novel one, given that this nonparametric method has not yet been applied in any of the prior studies of the ELG hypothesis in the Philippines.

References

Amrinto, L. E. and H. O. Zapata [2006] "A semiparametric assessment of export-led growth in the Philippines", *The Philippine Review of Economics* **18**(2): 1–22.

Austria, M. S. [2003] "The Philippines in the global trading environment: looking back and the road ahead", Philippine Institute for Development Studies Perspective Paper No 3.

Breitung, J. [2002] "Nonparametric tests for unit roots and cointegration", *Journal of Econometrics* **108**: 343–364.

Feder, G. [1983] "On exports and economic growth", *Journal of Development Economics* **12**: 59–73.

Felipe, J. [2003] "Is export-led growth passe? Implications for developing Asia", Asian Development Bank Economics Research Department Working Paper 48.

Felipe, J. and J.A. Lim [2005] "Export or domestic-led growth in Asia?" *Asian Development Review* **22**(2): 35–75.

Furuoka, F. [2007] "Econometric analyses of the export-led growth hypothesis: evidence for BIMP-EAGA countries", *Philippine Journal of Development* **34**(2):pp 25-42 (Second Semester).

Kim, S., H. Lim, and D. Park [2007] "Could imports be beneficial for economic growth? Some evidence from Republic of Korea", Asian Development Bank Economics Research Department Working Paper 103.

Lin, K. S., H. Y. Lee, and B. Y. Huang [1996] "The role of macroeconomic policy in export-led growth: the experience of Taiwan and South Korea", *Financial Deregulation and Integration in East Asia* **5**: 193–227.

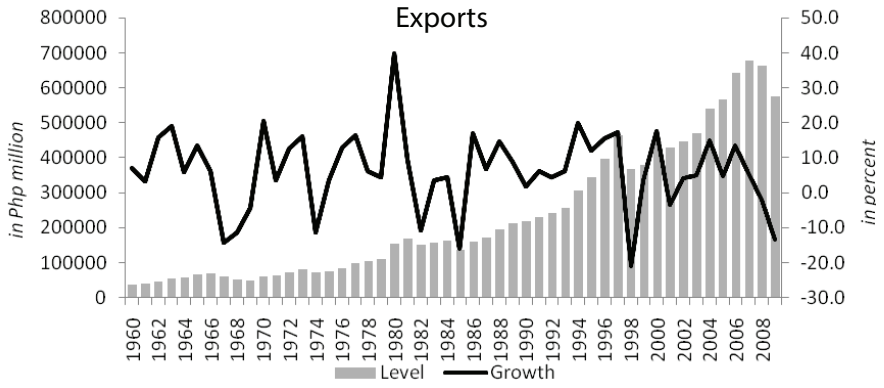
Riezmann, R., C. H. Whiteman, and P. M. Summers [1996] "The engine of growth or its handmaiden? A time-series assessment of export-led growth", *Empirical Economics* **21**: 77–110.

Sharma, A. and T. Panagiotidis [2005] "An analysis of exports and growth in India: cointegration and causality evidence (1971–2001)", *Review of Development Economics* **9**(2): 232–248.

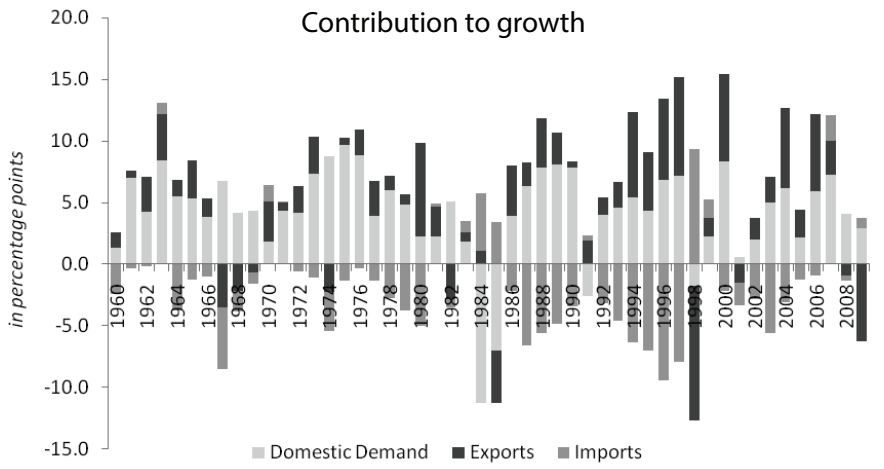
Yang, J. [2008] "An analysis of so-called export-led growth", International Monetary Fund Working Paper 08/220, September.

Appendix A. Exports (using the NIA concept): level, growth, and contribution to growth

A. Exports (in constant 1985 prices)

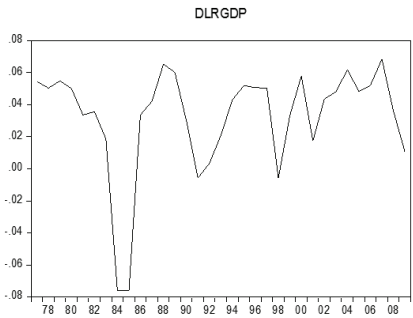


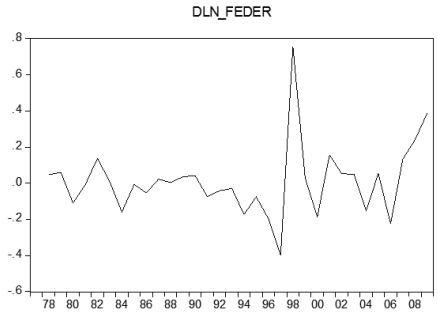
A. Contribution to growth (in constant 1985 prices)

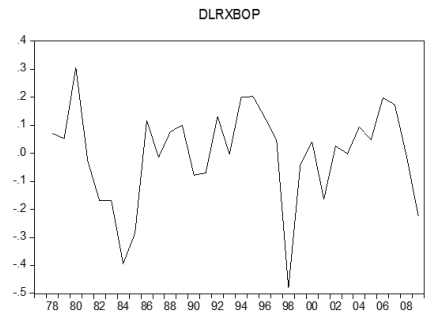


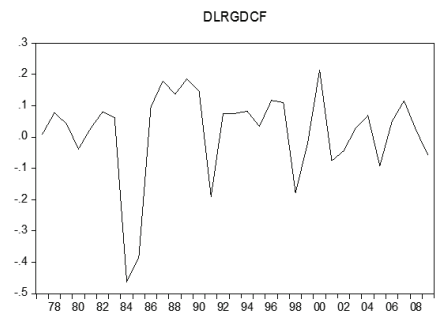
Appendix B. First difference of annual variables

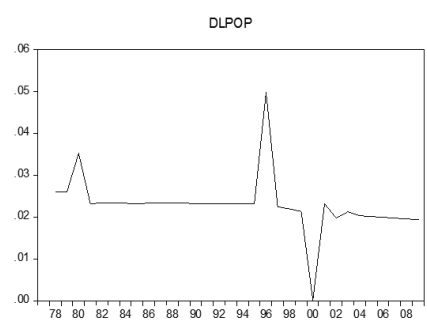
Annual

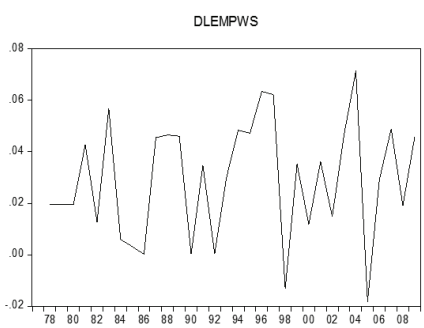


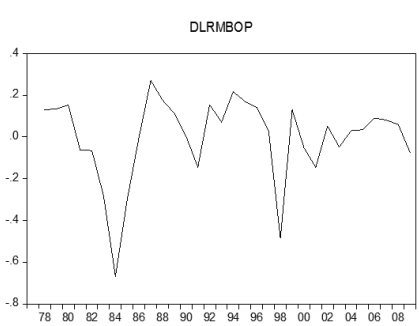




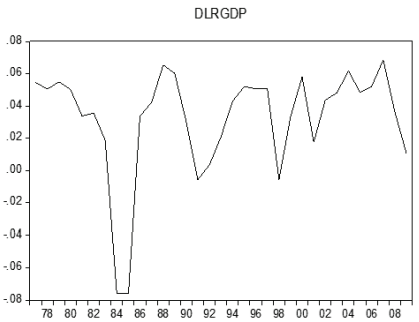


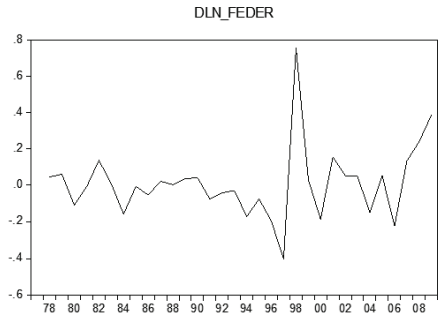


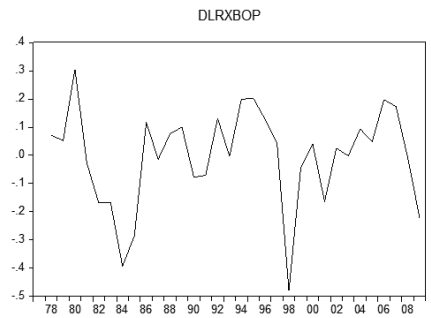


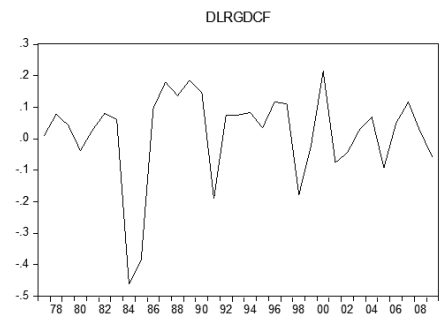


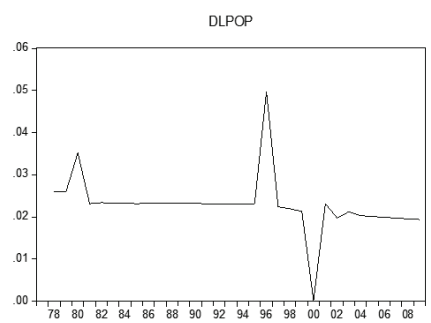
Quarterly

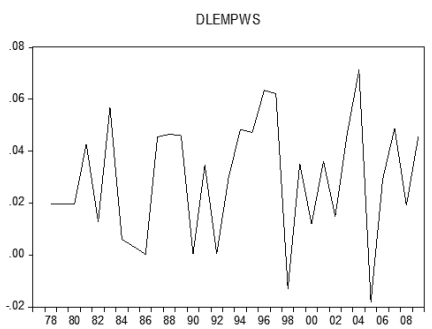

DLRGDP
.08
.06
.04
.02
.00
-.02
-.04
-.06
-.08
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08

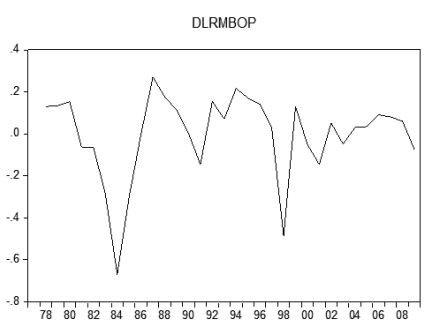

DLN_FEDER
.8
.6
.4
.2
.0
-.2
-.4
-.6
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08


DLRXBOP
.4
.3
.2
.1
.0
-.1
-.2
-.3
-.4
-.5
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08


DLRGDCF
.3
.2
.1
.0
-.1
-.2
-.3
-.4
-.5
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08


DLPOP
.06
.05
.04
.03
.02
.01
.00
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08


DLEMPWS
.08
.06
.04
.02
.00
-.02
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08


DLRMBOP
.4
.2
.0
-.2
-.4
-.6
-.8
78 80 82 84 86 88 90 92 94 96 98 00 02 04 06 08

Appendix C. Summary statistics

Annual

Sample: 1977 200							
	DLEMPWS	DLN_FEDER	DLPOP	DLRGDCF	DLRGDP	DLRMBOP	DLRXBOP
Mean	0.029159	0.010200	0.022950	0.015442	0.031542	-0.002384	-0.003775
Median	0.032388	0.006224	0.023128	0.055738	0.042577	0.044068	0.033453
Maximum	0.071396	0.757197	0.049776	0.214549	0.068492	0.271584	0.305142
Minimum	-0.018132	-0.399362	0.000130	-0.461837	-0.076057	-0.668570	-0.480759
Std. dev.	0.023094	0.200685	0.006926	0.149305	0.034253	0.201334	0.174510
Skewness	-0.208336	1.513622	0.896575	-1.619314	-1.955096	-1.605470	-0.888223
Kurtosis	2.161560	7.655411	11.75504	5.678445	6.736711	5.659766	3.665234
Jarque-Bera	1.168796	41.11608	106.4881	23.55038	39.00347	23.17932	4.797724
Probability	0.557441	0.000000	0.000000	0.000008	0.000000	0.000009	0.090821
Sum	0.933096	0.326384	0.734398	0.494159	1.009328	-0.076292	-0.120792
Sum sq. dev.	0.016533	1.248506	0.001487	0.691055	0.036371	1.256593	0.944062
Observations	32	32	32	32	32	32	32

Quarterly

0.9375 in								
	DLEMPWS	DLN_FEDER	DLPOP	DLRGDCF	DLRGDP	DLRMBOP	DLRXBOP	DUMCRISIS
Mean	0.007307	0.001652	0.005736	0.004206	0.007829	- 0.001078	-0.000486	0.244275
Median	0.004990	-0.004367	0.005782	0.000117	0.010249	0.008751	0.010258	0.000000
Maximum	0.102459	0.543928	0.020882	0.408220	0.025594	0.182204	0.237339	1.000000
Minimum	-0.044114	-0.442040	-0.006887	-0.745383	-0.035299	-0.348762	-0.264837	0.000000
Std. dev.	0.022356	0.083412	0.002284	0.159769	0.009733	0.084157	0.098219	0.431306
Skewness	1.024518	1.322227	1.170245	-0.494670	-1.934755	-1.135723	-0.294450	1.190371
Kurtosis	6.047721	22.14271	23.71852	6.034743	8.275506	6.153420	3.023429	2.416982
Jarque-Bera	73.61740	2038.340	2372.929	55.61202	233.6389	82.44006	1.895964	32.79279
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.387522	0.000000
Sum	0.957234	0.216420	0.751428	0.550942	1.025651	-0.141282	-0.063724	32.00000
Sum sq. dev.	0.064974	0.904474	0.000678	3.318415	0.012315	0.920716	1.254107	24.18321
Observations	131	131	131	131	131	131	131	131

Appendix D. Cross- correlation

Annual

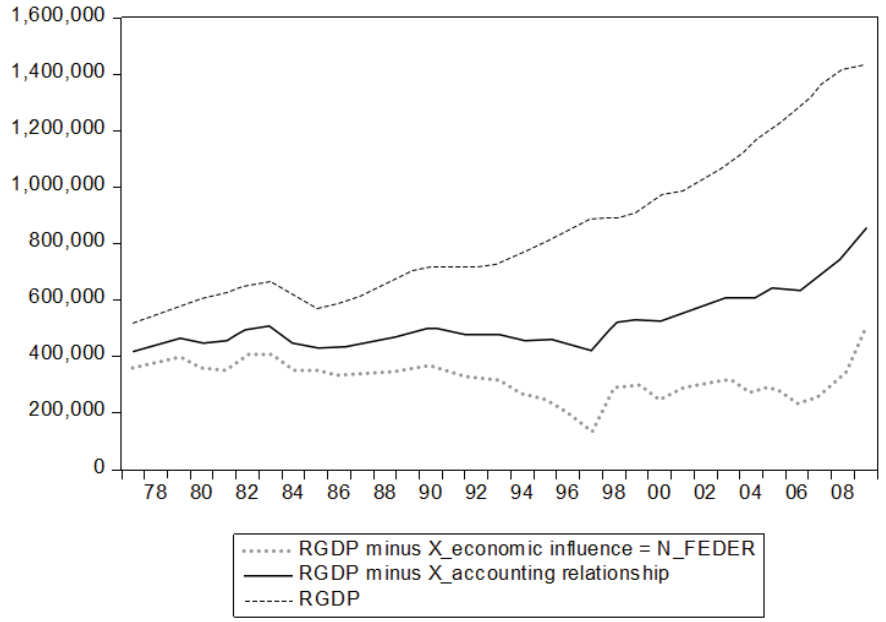
Sample (adjusted): 1978 2009							
Included observations: 32 after adjustments							
Balanced sample (listwise missing value deletion)							
Correlation	DLEMPWS	DLN_FEDER	DLPOP	DLRGDCF	DLRGDP	DLRMBOP	DLRXBOP
DLEMPWS	1.000000						
DLN_FEDER	-0.351856	1.000000					
DLPOP	0.221064	-0.107804	1.000000				
DLRGDCF	0.388326	-0.201133	-0.056308	1.000000			
DLRGDP	0.406557	-0.165366	-0.008629	0.849773	1.000000		
DLRMBOP	0.332958	-0.307846	0.162750	0.742288	0.770067	1.000000	
DLRXBOP	0.323085	-0.556018	0.164412	0.629897	0.741409	0.848208	1.000000

Quarterly

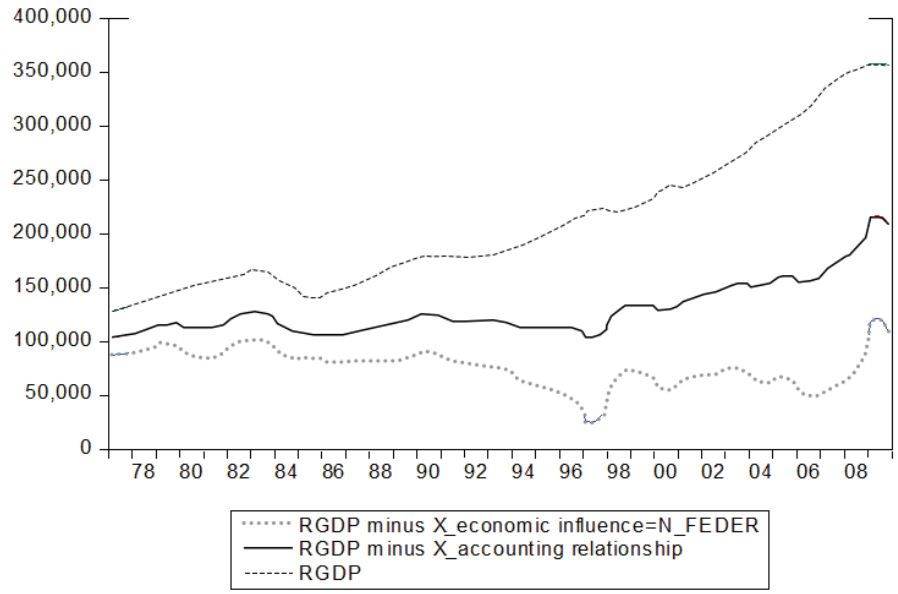
Sample (adjusted): 1977Q2 2009Q4								
Included observations: 131 after adjustments								
Balanced sample (listwise missing value deletion)								
Correlation	DLEMPWS	DLN_FEDER	DLPOP	DLRGDCF	DLRGDP	DLRMBOP	DLRXBOP	DUMCRISIS
DLEMPWS	1.000000							
DLN_FEDER	-0.081735	1.000000						
DLPOP	0.096859	0.062116	1.000000					
DLRGDCF	-0.142819	-0.078179	-0.054192	1.000000				
DLRGDP	0.122040	-0.230518	-0.033237	0.261506	1.000000			
DLRMBOP	0.060723	-0.345507	0.088736	0.054545	0.482301	1.000000		
DLRXBOP	-0.057347	-0.244231	0.068666	0.082777	0.419131	0.591404	1.000000	
DUMCRISIS	-0.039802	0.298595	-0.039975	-0.055852	-0.435181	-0.149078	-0.114876	1.000000

Appendix E. Comparative graph of actual GDP and GDP net of exports

Annual



Quarterly



Appendix F. Vector autoregression estimates

Annual

Sample (adjusted): 1979 2009			
Included observations: 31 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
	D(LN_FEDER)	D(LRGDCF)	D(LRXBOP)
D(LN_FEDER(-1))	0.133737	-0.016951	-0.069808
	(0.27309)	(0.13608)	(0.13680)
	[0.48972]	[-0.12457]	[-0.51029]
D(LRGDCF(-1))	0.240120	0.052646	-0.194960
	(0.34053)	(0.16968)	(0.17059)
	[0.70513]	[0.31026]	[-1.14288]
D(LRXBOP(-1))	0.207329	0.141301	0.105119
	(0.39451)	(0.19658)	(0.19762)
	[0.52554]	[0.71881]	[0.53192]
C	0.108900	0.102457	-0.016695
	(0.13021)	(0.06488)	(0.06523)
	[0.83637]	[1.57918]	[-0.25596]
DLOG(EMPWS)	-3.251194	1.037429	0.624534
	(1.80887)	(0.90133)	(0.90614)
	[-1.79736]	[1.15099]	[0.68922]
DLOG(POP)	-0.464285	-5.151029	-0.008188
	(5.42010)	(2.70074)	(2.71515)
	[-0.08566]	[-1.90726]	[-0.00302]
DLOG(RMBOP)	-0.275954	0.500956	0.707613
	(0.22857)	(0.11389)	(0.11450)
	[-1.20730]	[4.39848]	[6.18000]
R-squared	0.234274	0.654888	0.744587
Adj. R-squared	0.042842	0.568610	0.680733
Sum sq. resids	0.954966	0.237105	0.239641
S.E. equation	0.199475	0.099395	0.099925
F-statistic	1.223799	7.590432	11.66089
Log likelihood	9.953942	31.54811	31.38321
Akaike AIC	-0.190577	-1.583749	-1.573110
SchwarzSC	0.133227	-1.259946	-1.249307
Mean dependent	0.009025	0.013430	-0.006196
S.D. dependent	0.203890	0.151332	0.176847
Determinant resid covariance (dof adj.)		2.51E-06	
Determinant resid covariance		1.17E-06	
Log likelihood		79.80199	
Akaike information criterion		-3.793677	
Schwarz criterion		-2.822266	

Quarterly

Sample (adjusted): 1978Q3 2009Q4			
Included observations: 126 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
	DLOG(N_FEDER)	DLOG(RGDCF)	DLOG(RXBOP)
DLOG(N_FEDER(-1))	0.482175	-0.082652	-0.019852
	(0.08980)	(0.16440)	(0.09945)
	[5.36943]	[-0.50275]	[-0.19962]
DLOG(N_FEDER(-2))	0.130359	0.052445	-0.118606
	(0.08773)	(0.16061)	(0.09716)
	[1.48591]	[0.32653]	[-1.22073]
DLOG(N_FEDER(-3))	-0.054270	0.006890	0.097778
	(0.09061)	(0.16588)	(0.10035)
	[-0.59895]	[0.04153]	[0.97440]
DLOG(N_FEDER(-4))	-0.528447	0.165404	0.020348
	(0.10048)	(0.18396)	(0.11128)
	[-5.25908]	[0.89915]	[0.18285]
DLOG(N_FEDER(-5))	0.313969	0.027876	0.002295
	(0.09358)	(0.17133)	(0.10364)
	[3.35497]	[0.16271]	[0.02214]
DLOG(RGDCF(-1))	0.093946	-0.559962	-0.062744
	(0.05389)	(0.09866)	(0.05968)
	[1.74333]	[-5.67592]	[-1.05133]
DLOG(RGDCF(-2))	0.102679	-0.280010	-0.004269
	(0.06151)	(0.11261)	(0.06813)
	[1.66922]	[-2.48645]	[-0.06266]
DLOG(RGDCF(-3))	0.047918	-0.438688	-0.136440
	(0.05955)	(0.10902)	(0.06595)
	[0.80469]	[-4.02401]	[-2.06886]
DLOG(RGDCF(-4))	0.084620	0.132399	-0.217278
	(0.05782)	(0.10586)	(0.06404)
	[1.46343]	[1.25072]	[-3.39295]
DLOG(RGDCF(-5))	0.031905	0.134926	-0.087472
	(0.05504)	(0.10076)	(0.06095)
	[0.57967]	[1.33906]	[-1.43503]
DLOG(RXBOP(-1))	0.034440	0.191071	-0.107726
	(0.07892)	(0.14449)	(0.08741)
	[0.43637]	[1.32242]	[-1.23248]
DLOG(RXBOP(-2))	0.045952	0.520214	-0.119160
	(0.07131)	(0.13056)	(0.07898)
	[0.64436]	[3.98459]	[-1.50876]
DLOG(RXBOP(-3))	-0.084474	0.579334	0.242464
	(0.07505)	(0.13740)	(0.08312)
	[-1.12554]	[4.21639]	[2.91707]

Sample (adjusted): 1978Q3 2009Q4			
Included observations: 126 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
	DLOG(N_FEDER)	DLOG(RGDCF)	DLOG(RXBOP)
DLOG(RXBOP(-4))	-0.110757	0.091466	0.372874
	(0.08127)	(0.14877)	(0.09000)
	[-1.36291]	[0.61480]	[4.14305]
DLOG(RXBOP(-5))	-0.031045	-0.085005	0.066026
	(0.08640)	(0.15818)	(0.09569)
	[-0.35930]	[-0.53738]	[0.68999]
C	-0.038739	0.051581	0.001951
	(0.01588)	(0.02907)	(0.01758)
	[-2.44005]	[1.77467]	[0.11099]
DLOG(EMPWS)	-0.137190	-0.696186	-0.612741
	(0.25863)	(0.47348)	(0.28643)
	[-0.53045]	[-1.47037]	[-2.13926]
DLOG(POP)	5.075331	-6.678635	1.303507
	(2.50296)	(4.58224)	(2.77199)
	[2.02773]	[-1.45750]	[0.47024]
DLOG(RMBOP)	-0.194796	0.052171	0.550853
	(0.07948)	(0.14551)	(0.08802)
	[-2.45083]	[0.35854]	[6.25794]
DUMCRISIS	0.037543	-0.003535	-0.011728
	(0.01451)	(0.02656)	(0.01607)
	[2.58741]	[-0.13306]	[-0.72987]
R-squared	0.546369	0.585581	0.598089
Adj. R-squared	0.465058	0.511298	0.526049
Sum sq. resids	0.410108	1.374506	0.503006
S.E. equation	0.062201	0.113873	0.068886
F-statistic	6.719491	7.883150	8.302120
Log likelihood	182.0536	105.8595	169.1902
Akaike AIC	-2.572280	-1.362850	-2.368099
Schwarz SC	-2.122077	-0.912646	-1.917895
Mean dependent	0.001351	0.003501	-0.000928
S.D. dependent	0.085044	0.162892	0.100061
Determinant resid covariance (dof adj.)		2.19E-07	
Determinant resid covariance		1.30E-07	
Log likelihood		462.4817	
Akaike information criterion		-6.388599	
Schwarz criterion		-5.037989	