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THE GROWTH EFFECTS ON DEGROWTH: WHAT REMAINS OF THE CENTER-PERIPHERY MODEL?

Fakhri Issaoui
ESEN, Université de la Manouba, Manouba, Tunisia
E-mail: fakhriissaoui@yahoo.fr

Talel Boufateh
ESC de Tunis, Université de la Manouba, Manouba, Tunisia
E-mail: stalelb@yahoo.fr

Hanène Ben Ouada Jamoussi
ESC de Tunis, Université de la Manouba, Manouba, Tunisia
E-mail: henenbwj@hotmail.com

Mourad Guesmi
FSEG de Jendouba, Université de Jendouba, Tunisia
E-mail: guesmimourad38@gmail.com

Abstract
Although economic growth is considered to be one of the most discussed and studied topics by economists, some questions are hitherto unexplored. In this article we will try to address one of these issues by studying the effect of hegemonic countries' growth shocks on the growth of peripheral countries. By using a SVEC model, we have shown that although peripheral countries' integration into trade relations with center countries may allow short and medium-term growth, it prevents them from confirming their long-term economic independence.

Keywords: Growth, Degrowth, Center-Periphery, Development, SVEC model

JEL classification: O1, O11, F15

1. Introduction

There is no doubt that economic growth is one of the most discussed topics by economists. Such studies are divided into three distinct areas. The first focused on the sources of growth (exogenous growth versus endogenous growth), the second analyzed the growth effects on macroeconomic variables while the third axis studied and identified the key macroeconomic variables that can affect growth.

It is worth noting that the importance of our chosen topic inside the literature in the field is based on two principles. First, in our paper we suppose that the growth of center countries is relatively dependant of that of peripheral countries. The logic of this interdependence is conceptualized in term of growth shocks. Second, our paper does not consider the classical indicators which are often used to analyze the center-periphery model (exchange terms, international trade indicators etc). Indeed, a new approach will be used trying to analyzing the effect of growth shocks on long-run growth.

However, to our knowledge, no study has been able to examine the effect of the economic growth of one country on the economic growth of other countries, despite many theories that are geared towards similar problems. Thus, the main purpose of this article is to study the effect of developed countries' growth on developing countries' growth and vice versa. Indeed, the importance of such a relationship is to test two hypotheses often questioned and rarely verified. To what extent does the growth in developed countries affect the growth of Developing countries? Does a symmetrical exchange of growth exist? If not the case, what kind of country benefits more from the growth exchange? Thus, this paper will try to respond to all questions asked above.

In order to solve the problematic and address this range of issues, we will be forced, in the second section, to expose the main explanatory theories of development. In the third section, we focus on the appropriate methodology to determine the effect of growth shocks (in developed countries) on developing countries' growth and vice versa. The fourth section will attempt to analyze and interpret the empirical results. The last section will conclude the main results of the paper.

2. Development theories and transmission mechanisms

According to liberal theory, development is the result of trade exchange that can take place between two countries regardless of their state of development. According to the classical view, the exchange between a central region (which is considered industrialized) and a peripheral region, allows the convergence of initially unbalanced growth in the long-run. Indeed, it is admitted that central regions (where wellbeing exceeds that recorded in peripheral regions due to industrialization) transmit, through the exchange, some gain of productivity due to the specialization.

The Ricardian model of comparative advantage that of the HOS (based on the factor endowments of a trading region) and all posterior models have converged towards a consensus stating that all exchangers can benefit from the exchange. However, these models have not asked the questions underlying the distribution of profits or the trade effects on underdevelopment. Indeed, in liberal philosophy it is most important that the exchange lead to reciprocal gains. Who benefits most from these gains remains a secondary question. Smith summed up the charitable exchange saying, "Give me what I need and you'll have from me, that, you need". This line of conduct constitutes the basic logic and the strategic guideline of the international financial institutions (IFIs) that have summarized the issue of development as a country's mere consent to open its borders to trade.

Beyond these theoretical discussions and far away from all criticism there is a main truth. Commercial exchange is beneficial to both consumers (who have more varieties of goods) and producers (who will enjoy a wider sized market). However, could these gains recorded by a country engender development? The answer to this question is a-priori negative, especially when the exchange takes place between a developed and a developing country.

Indeed, it is commonly accepted that trade exchange allows a more specific and specialized international division of labour. Also, it allows an efficient reallocation of economic resources which results from sectorial specialization. Thus, two types of economies are created: the first concerning developing countries where the productive sectors are, generally, labour-intensive (e.g. primary and tertiary sectors); the second is related to developed countries where there are capital-intensive sectors.

It is worth noting that such specialization and international division of labour can generate growth for the two economic types, but not necessarily the develop-ment or at least "developing development" concept to which we are so attached because it distinguishes the development of socio-economic structures (UAE, Denmark, Norway etc.) from the development that can generate development for third countries (USA, UK, France, Japan etc..).

In this context, Prebisch (1950), partisan and defender of the economic independence theories, emphasized in his work the ideal appearance of economic theories which veil the actual outcomes of economic exchange. Often, when periphery countries have recorded deterioration in their terms of trade in the medium and long-term, economic exchange does not lead to a fair exchange. In order to cope, the peripheral countries need to develop strategies based on import substitution industries (ISI).

Gunnar Myrdal (1978) accused the market mechanisms that are unable, on a macroeconomic scale, to ensure equilibrium. Thus, the free market mechanisms, which are based on the supply and demand forces and on price flexibility at domestic and / or international level, can only exacerbate inequality. He states that the entire structure of developing countries' economies and international trade has become this distorted and unbalanced as a result of generations of uncontrolled market forces. This is explained by the fact that nothing can be less effective than developed countries' selfish policies. In this context, Krugman (1990), who tried to develop Myrdal's thesis, has shown that even if the structure of localization between the center and the peripheral is unchanged, the centre peripheral logic always appears. Thus, the welfare recorded in the center region is acquired

only at the expense of welfare in the peripheral region. In other words, there is a trade-off between the two zones in terms of growth and wellbeing.

For his part, Arghiri (1975) refuted the assumption of trade ex-change fairness between countries with different development levels. The author assumes that international trade between the periphery and the center never leads to an equal exchange. Also, the said exchange, equal in appearance and uneven in its logic, involves the economic exploitation of the periphery by developing countries.

Indeed, as long as developed countries (center) export capital-intensive goods and developing countries (periphery) export labour-intensive goods, then it follows that exchange between the two groups of countries can be neither fair nor just. In other words, given that the peripheral countries export goods containing strong labour values and import goods with low labour values (capital goods), this leads to a transfer of surplus profit, from developing to developed countries. For S Amin (1973), the capitalist mode of production is the principal cause of under development affecting southern countries. They are obliged to trade with developed countries while accepting unfair trade rules and principles. Hence it can be concluded that there will be a wealth transfer from the periphery countries to those of the center, allowing them to further their development to the detriment of developing countries. For Huriot and Perreur (1995), the core-periphery structure, supposed to be "a source of inequality, asymmetry, polarization and domination", should not be seen through a "very simplistic" dualism, but rather examined in terms of «diffuse, progressive and subjective centrality. » The authors present a model in which they incorporate, in addition to the aspects of inequality, asymmetry and polarization, domination which is related to center-periphery structure, the valuation of which they call “symbolism and pure imaginary” which is related to the idea of center-periphery.

Grasland and Hamme (2010) highlight that disequilibrium between the center and peripheral area is evidence. This disequilibrium observed both in the world and in Europe, is mostly due to the division of labour. The authors have concluded, from a time series on the international exchange, that there was a reconstruction of world trade between 1975 and 2005 and that an industrial relocation was also produced at European level. Thus this industrial relocation redefined the list of goods produced by the center countries. Indeed, those countries substituted the production of low value-added goods with the production of high value-added goods (the sectors of aerospace, telecommunication, and information technology). Consequently, the first list of goods was transferred to the peripheral countries which meant that the development gap between the two zones increased more and more.

Combes et al. (2000) have used the indicators of economic opening and a series of structural variables for different regions of the world (low and middle-income economies and high-income economies) to assess the evolution of the instability of growth rates. Thus the authors have considered, as a measure of macro-economic instability, the difference between the growth rate of a product and a trend value chosen by estimating a representative equation of the growth rate trend. Thus an indicator of growth rate instability was calculated over three sub-periods: 1970-1975, 1976-1986 and 1987-1995.

The authors conclude that the size of the country appears as a strategic factor which reduces the growth rate instability. The authors have provided two justifications. The first is that the policy of trade liberalization improves the ability of countries to properly manage external shocks induced by an economic opening. Also, it leads to more stable growth and creates a diversification of activities allowing "some compensation of economic sectorial cycles". The second is that the center countries are structurally less open and, consequently, less exposed to international economic fluctuations. Doppenholfer et al. (2004) consider 67 variables and find that only 18 can be considered as robust determinants of growth. Among these 18 variables, several can be considered as structural factors, such as geographical location, colonial history and the religious composition of the population. However, the intensity of trade openness does not have a robust effect on growth.

Mazur (2000) has noted that globalization is one of the most important factors which leads to increased inequality. This means that globalization has further enriched the center countries at the expense of peripheral countries. However, in our simple view, we believe that the problem of underdevelopment lies not only in the simple deterioration of terms of trade or the simple process of domination that hegemonic countries exercise over developing countries, but rather in a more important factor. In fact, do the development strategies adopted by the center countries determine the degree and nature of development which peripheral countries must comply with and accept?

The ex-ante determination of these strategies will lead to an action plan from the center countries that revolves around the classic questions that political economics has exposed since its inception: what and how to produce? The answer to this question leads, each time, to the setting of productive plans which set all other economic variables that are in accordance with the principles of productive efficiency (e.g. target markets, market strategies, inputs, etc.). This determines the periphery role that productive efficiency must play in every moment of history by providing the peripheral countries with the only possibilities allowed by the center. Thus, we believe that the international division of labour is the culmination of the development plan adopted and decided upon by the center. The persistence of underdevelopment depends in large measure on the difficulty which faces the periphery in anticipating the center's actions in terms of development strategies.

Thus, it seems difficult for small countries like Tunisia, Morocco and Algeria to anticipate EU and U.S. strategies in terms of development (type of investment, technological content, new research topics etc.). Therefore, faced with an information shortage (which itself is the result of underdevelopment), it would be impossible for such countries to adopt the paths of long-term growth and consequently create developing development.

The center countries, benefiting from the information gap between them-selves and the periphery countries, easily determine the latter's behaviour by forcing them to undergo their development program (producing their own in-puts, natural resources exploitation, rent transfer, allowing them to sell their outputs in the center's markets etc.). Indeed, this implicit type of contract, established between developing and developed countries, is a specific form of the agency theory applied, in our case, on a more aggregated and distant level, rather than on businesses and firms, namely macro-Nations' agency problems.

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3. Estimation method

The purpose of this paper is to study the effect of growth on growth. Whether it be a case of developed or developing countries, an explicit or implicit evaluation, the issue of growth remains at the heart of economic analysis and the focus of the vast majority of economists. The point that we raise at this stage is that, despite the multitude of works on the issue of economic growth, almost all of these studies aim to test the effect of different economic aggregates on growth. We propose, however, a study of the reactions of short and long-term growth in developed countries following shock growth in developing countries and vice versa. In methodological terms, the idea is to consider in which situations economic growth could be considered both a simple economic variable and a target variable.

Making use of the approach of SVEC models, this issue will be addressed in two parts. The first part will be dedicated to the first sub-model which aims to study the interaction between the growth of France as a developed country and the growth of Morocco and Tunisia as developing countries. The second part contains the second sub-model which will be devoted to the USA, Canada, Venezuela and Cuba.

3.1. The structural approach

By overcoming standard VAR models limitations, the pioneering work of Sims (1986), Bernanke (1986), Blanchard and Watson (1986) and Blanchard and Quah (1989) aims to specify an economically interpretable framework through SVAR model. This kind of structural model was designed to allow economists to achieve a more rigorous interpretation of the transmission of an economic policy impulse to the economy[1]. Using economic fundamentals, SVAR methodology try to detect a set of independent shocks through the imposition of few short and / or long-term identification restrictions[2].
The general form of SVAR model can be expressed as follows:

$$B_0 Y_t = \sum_{i=1}^{p} B_i \, Y_{t-i} + w_t \qquad (1)$$

where the matrix B_0 of $(N \times N)$ dimension contains terms equal to the uniton the main diagonal that expresses the simultaneity relationship between the variables constitutingY_t. The squared matricesB_i,

[1] Analysing results from a VAR model is made by studying causality between variables, forecast error variance decomposition and impulse response functions. Through these tools, SVAR methodology considerably succeeded in two major areas of research: the interpretation of business cycle fluctuations of macroeconomic variables and identification of the effects and transmission mechanisms of economic policies.
[2] These restrictions are considered short-term when they express lack of instantaneous responses of some variables to some structural impulses. However, when some impulses have no lasting effect on some components of the system, the restrictions are long term.

for $i = 1, \ldots, p$, contain thestructural parameters of the model and the vector $w_t = (w_{it} \ldots w_{nt})'$ contains$N$structural innovations (shocks).
The reduced form (standard VAR) of the SVAR model can be written as follows:

$$Y_t = \sum_{i=1}^{p} B_o^{-1} B_i Y_{t-i} + B_o^{-1} w_t \quad (2)$$

$$= \sum_{i=1}^{p} A_i Y_{t-1} + \varepsilon_t \quad (3)$$

where A_i, for $i = 1, \ldots, p$,are the squared matrices related to lagged vectors $Y_{t-i}$for lag order p, containing the model parameters. The vector $\varepsilon_{1t} = (\varepsilon_{1t} \ldots \varepsilon_{Nt})$contains the N canonical innovations. The variance-covariance matrix is asymmetric $(N \times N)$ matrix describing the stochastic interdependence structureof canonical innovations ε_t. We can note from (1) and (2) that SVAR representation is derived from the reduced VAR representation assuming that the vector of canonical innovations ε_t is a linear combination of structural innovations w_t of the same date $\varepsilon_t = B_o^{-1} w_t$.
To identify the SVAR model, we should first estimate the standard VAR model, since the matrix B_o is unknown. The variance-covariance matrix $\sum_{\varepsilon}$ is symmetric which means that,$\frac{N(N+1)}{2}$ restrictions are provided by the model. However, $B_o$contains N^2 unknown elements. Then, at least $\frac{N(N-1)}{2}$ additional restrictions remain to identify the structural form. Given that $B_o$contains N^2 unknown elements. Then, at least $\frac{N(N-1)}{2}$ additional restrictions remain to identify the structural form.

3.2. SVECM

To ensure the existence of a vector moving average (VMA) form of the model, both short-run and long-run approaches of the SVAR model identification are supposed to be applied to stationary models in level or in difference. When a VAR model contains components I(1) and econometric tests reveal the pres-ence of cointegration relationships between the variables then, it is no longer appropriate to keep the VAR specification and a VECM should be specified.
The cointegration theory, initiated by Granger (1981, 1983), Granger and Weiss (1983) and Engle and Granger (1987), states that if there is at least one stationary linear combination between I(1) series of the model, they are called cointegrated. According to this theory, linear relationships between I(1) components can be considered as long term equilibrium relationships leading, to some extent, to compensating the non-stationary series.

Assuming that the number of components constituting Y_t at the VAR equation presented by (2) is N = 3 for the first sub-model (N = 4 for the second sub-model) and that these three (four) series are I(1) and are cointegrated of order (1, 1), the VAR model should be transformed to a VECM form as follows:

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$$\Delta Y_t = \alpha\beta' Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \quad (4)$$

$$= \pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \varepsilon_t \quad (5)$$

where Δ is the first difference operator, With $\Gamma_i = -(A_{i+1} + \cdots + A_p)$ for $i = 1, \ldots, p-1$, the rank of $\pi = -(I_n - A_t - \ldots - A_p)$ is equal to $r < 3$ (for the first sub model ($r < 4$ for the second sub-model). which is equivalent to consider that $r = 1$, because all three series (four series) are co-integrated of order (1, 1)), and α (the weight matrix) and β (the cointegration matrix) are of dimension (3, 1), ((4,1) for the second sub-model) and of a rank equal to $r = 1$.

Ones the VECM is specified, we need to reverse its expression to deduce the VMA form necessary for both of reduced and structural impulse response functions (IRF) and forecast errors variance decompositions (DVEP). The approach used in this regard is the common trend one introduced by Warne (1991, 1993), Lütkepohl and Reimers (1992) and Johanson (1995). According to this representation, the long-term co-movement of cointegrated series is governed by a common trend, which reduces consequently the number of stochastic trends.

More explicitly, when the rank of a cointegration vector Y_t CI(1, 1) is r = 1, it is possible to consider through the application of the common trend representation that r stochastic trends are eliminated and that it remains in the first sub-model case for example only k = N − r = 2 (k = N − r = 3 for the second sub-model) trends which become common to the N components of Y_t.
Referring to the Granger representation theorem, the VECM equation given by (5) can be rewritten as the VMA form of Beveridge-Nelson decomposition of Y_t as follows:

$$Y_t = Y_o^* + +\Xi^*(L)\varepsilon_t + \Xi\sum_{i=1}^{t} \varepsilon_i \quad (6)$$

$$Y_t = Y_o^* + = Y_t^S + Y_t^P \quad (7)$$

Y_o^* contains the initial value of the series, $Y_t^s = \Xi^* L(\varepsilon_t) = \sum_{j=0}^{\infty} \Xi_j^* \varepsilon_{t-j}$ is the stationary component of Y_t, $Y_t^P = \Xi \sum_{i=1}^{t} \varepsilon_i$ is the permanent component of Y_t and $\Xi = \beta_\perp [\alpha_\perp' (I_N - \sum_{i=1}^{p-1} \Gamma_i) \beta_\perp]^{-1} \alpha_\perp'$.

According to this representation, the process Y_t is decomposed into two parts: I(0)and I(1). As described by the equation (6), the process Y_t is governed by r components I(0) represented by Y_t^s and k = N − r components I(1) represented by Y_t^p. Ones the N structural innovations w_t, deduced from the expression $\varepsilon_t = B_0^{-1} w_t$, are identified, we may consider that only r of them have short-term effects. The permanent effects of structural shocks is given by substituting $\varepsilon_t = B_0^{-1} w_t$ in the expression of common trend $\Xi B_0^{-1} \sum_{i=1}^{t} w_i$.
It follows then that the long-term effects of structural shocks w_t are given by the matrix ΞB_0^{-1}. Taking into account aforementioned information, we need 1/2 r(r − 1) restrictions to identify transitory shocks and 1/2 k(k − 1) restrictions to identify permanent shocks to cover the N(N-1)/2 additional restrictions necessary for structural model.
It therefore follows that the first sub-model, where the vector Y_t consists of three I(1) series cointegrated of order (1, 1), suppose the imposition of 1/2r(r − 1) = 0 additional restriction to

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identify temporary shocks and 1/2 k(k − 1) = 1 additional restriction to identify permanent shocks. The structural innovations vector w_t admits three shocks: two permanent shocks as the two first components of w_t and a third transitory shock. Assuming that the second long term shock exerts no permanent effect on the first variable, we may write the restrictions as follows:

$$\Xi B_0^{-1} = \begin{bmatrix} * & 0 & 0 \\ * & * & 0 \\ * & * & 0 \end{bmatrix} and\ B_0^{-1} = \begin{bmatrix} * & * & * \\ * & * & * \\ * & * & * \end{bmatrix} \quad (8)$$

Concerning the second sub-model with four I(1) series cointegrated of order (1, 1), the restrictions needed for identification are given by 1/2 r(r − 1) = 0 additional restriction to identify transitory shocks and 1/2k(k − 1) = 3 additional restrictions for permanent shocks. The identification scheme assumes placing the three permanent shocks as the first components of the vector w_t. The identification is also realized by assuming that the third long term shock exerts no permanent effect neither on the first variable nor on the second one and that the second long term shock exerts no permanent effect on the third variable. Restrictions of the second sub-model should therefore be written as follows:

$$\Xi B_0^{-1} = \begin{bmatrix} * & * & 0 & 0 \\ * & * & 0 & 0 \\ * & 0 & * & 0 \\ * & * & * & 0 \end{bmatrix} and\ B_0^{-1} = \begin{bmatrix} * & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{bmatrix} \quad (9)$$

4. Data

As mentioned above, our paper contains two sub-models. The first sub-model which is a trivariate model aims to study the interaction between the growth of France (GDP FR), the growth of Morocco (GDP MOR) and the growth of Tunisia (GDP TU). The series of GDP FR (constant 2000 US$), GDP MOR (constant 2000 US$) and GDP TU (constant 2000 US$) are obtained from the World Bank. Data are annual and spread over the 1961-2011 period for France, Morocco and Tunisia.
The second sub-model consists of four variables: US growth (GDP US), Canadian growth (GDP CAN), Venezuelan growth (GDP VEN) and Cuban growth (GDP CUB). Data are obtained from the same first sub-model source and cover the period 1970-2010.

Referring to the usual unit root tests (Augmented Dickey-Fuller (ADF) and Phillips Perron (PP)), both of logarithms of the first sub-model series and logarithms of the second sub-model series are I(1) (see Tables 1 and 2). Moreover, the two sub-models are characterised by an upward trend in their series (see graphs 1 and 2). So we suspect the existence of a cointegration relation between the variables of each sub-model. Johansen procedure (1988) will be applied to test the presence of cointegration for our two sub-models.

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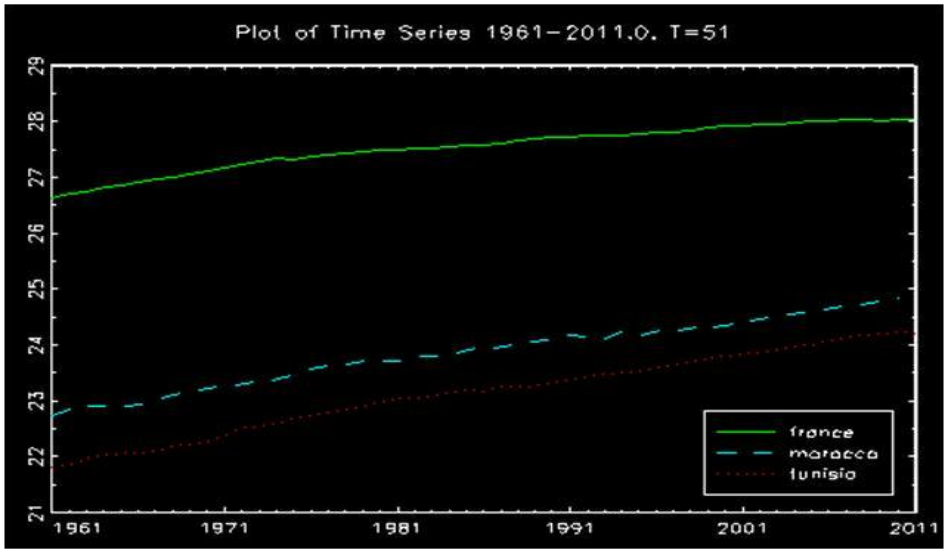

Figure 1 - Evolution of logarithms of GDP FR, GDP MOR and GDP TU during 1961-2011

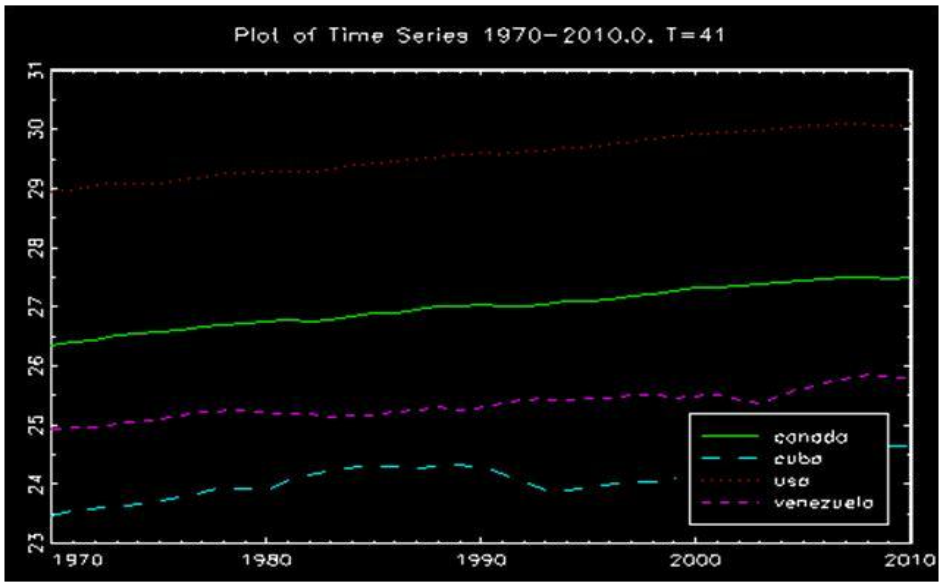

Figure 2 - Evolution of logarithms of GDP US, GDP CAN, GDP CUB and GDP VEN during 1970-2010

Table 1 - First sub-model's results of ADF and PP tests

Variables	ADF		PP	
	level	First difference	level	First difference
GDPFR	-2.015	-10.301	-2.113	-10.434
GDPMOR	-1.012	-10.296	-1.334	-10.311
GDPTU	-2.011	-7.056	-2.207	-7.056
5% critical value	-2.922	-2.922	-2.921	-2.922

Table 2 - Second sub-model's results of ADF and PP tests

Variables	ADF		PP	
	level	First difference	level	First difference
GDP US	-1.579	-4.626	-1.711	-4.418
GDP CAN	-2.178	-4.337	-1.959	-4.177
GDP VEN	-0.489	-4.966	-0.572	-4.835
GDP CUB	-1.205	-3.434	-1.285	-3.430
5% critical value	-2.936	-2.938	-2.936	-2.938

It is worth noting that application of Johansen procedure (1988) is crucially related to the choice of the retained specifications. In other words, it should be précised whether cointegration and VECM contain or not constant and / or trend. The specification adopted in our two sub-models is the one that assumes absence of trend in the cointegration relations and the presence of constant in the VECMs. Two motivations are behind such choice. The first economic reason is that the trend does not intervene in the long-term relation linking different levels of growth. This is especially confirmed when dealing with growth gap between developing and developed countries. The second motivation associated with the presence of a constant in the VECM back to the fact that, for both of our two sub-models, logarithmic series have an upward linear trend.

Results related to the trace test statistics of the two considered models are summarized in table 3. The calculated values of the trace statistics for both of the first and the second model are respectively 45.72 and 55.87. Given that these values are higher than critical value at a 5% risk level (35.07 for the first model and 53.94 for the second one), we reject the null hypothesis of no cointegration for the both models. However, we accept the null hypothesis according to which there is at most one cointegration relation ($18.75 < 20.16$ for the first sub-model and $27.04 < 35.07$ for the second sub-model) at a 5% risk level. Which means that the trace test procedure should be stopped at the cointegration rank $r = 1$. It follows then that the appropriate specification that should be retained for our both models is the multivariate VECM .The choice of the VECM order is based on the AIC

selection criterion. We retain a number of lags in our VECMs equal to 1 for the first sub-model and 2 for the second sub-model.

Table 3: Johansen cointegration tests

Sub-model	Number of cointegrating vector	Eigenvalue	Trace statistic	Rank r
1st sub-model	None	45.72	35.07	0
	Almost one	18.75	20.16	1
	Almost two	7.29	9.14	2
2nd sub-model	None	55.87	53.94	0
	Almost one	27.04	35.07	1
	Almost two	9.19	20.16	2
	Almost three	2.26	9.14	3

As mentioned above, once VECM form of each sub-model is estimated, deduction of their structural form depends on the identification of the matrix

ΞB0−1. Given that the first sub-model is a trivariate model with one cointegration relation, the just identification of its SVECM form requires only one long-term additional restriction ($1/2\ r(r-1)=0$ et $1/2k(k-1)=1$). However, the second sub-model includes four series characterised by one cointegration relation. Which means, in this case, that the identification of the SVECM form needs three long-term additional restrictions ($1/2r(r-1)=0$ et $1/2\ k(k-1)=3$).
Economically speaking, with the exception of the third restriction of the second sub-model, all restrictions of our two sub-models are imposed so that the shock of growth in less developed countries has no persistent effect on the most developed countries' growth. Indeed, the identification scheme of the first sub-model assumes that Moroccan growth shock has no long-term effect on French growth. Leaving as with the form of restriction described by equation (7).

In the case of the second sub-model, the first two restrictions assume that Venezuelan growth shock is of no persistent effect neither on the American growth nor on the Canadian one. The third restriction is imposed such that Canadian growth shock has no long-term effect on Venezuelan growth. The theoretical underpinning of this last restriction back to the near absence of economic relations between the two considered countries. The structural innovations vector wt contains four shocks: three permanent shocks (the American shock, the Canadian shock and the Venezuelan shock) and a transitory shock (the Cuban shock). Respecting this order of shocks at the level of vector wt, the restriction takes the form described by equation (8).

5. Results analysis and economic implications

Generally, to study the effects of growth shocks on growth or any other similar problematic, we should resort to a dynamic multivariate analysis. Thus, in this paper we propose a study of two panels of countries. As mentioned above, the first one is comprised of France, Morocco and Tunisia. The

second group is comprised of the U.S., Canada, Venezuela and Cuba. Our choices are based on the necessary simultaneous existence, in each of the two groups, of a hegemonic country and peripheral countries. Indeed, in the first panel of countries, France represents the hegemonic country while Morocco and Tunisia are the peripheral ones. In the second model, it is clear that the U.S. and Canada are considered to be hegemonic countries while Cuba and Venezuela are considered peripheral countries. We believe that the economic sensitivity of the two samples of countries to growth shocks should be treated both in the short-term and in the long-term.

5.1. The first sub-model

Recall that the first sub-model contains two long-term shocks and one short-term shock. Thus, only one additional restriction is maintained to identify this model; the Moroccan shock has no long-term effects on French growth.

5.1.1. Responses to long-term shocks

According to figure (3), we note that the long-term GDP growth shock effects in France were simultaneously positive and increasing in France and Morocco, and negative and decreasing in Tunisia. Thus, it seems that the Moroccan economy contributes actively to French growth and benefits consequently from their growth shocks. This allows us to confirm that Morocco is becoming, more and more, a new economic power in the north of Africa, given its dynamics and competitiveness. The latter have allowed Morocco to become an attractive place for French investments. However, in the case of Tunisia, we note that the long-term French shocks have had negative and decreasing effects. This can be explained by its large dependence on France.

According to the impulse response functions associated with figure (4), we note that the long-term growth shock effects in Morocco are negative and de-creasing in France; but positive and increasing in Morocco and Tunisia. So, it seems that a complementary economic relationship exists between Morocco and France, which is explained by the mechanism of French investment in Morocco. Indeed, it is plausible to assume that Morocco's growth shock are, in part, the result of the shocks that French companies face (Total, Vivendi Universal, Suez, EDF, Renault.etc.) in Morocco (French investments represent 51% of the total foreign direct investment). However, Tunisia has largely benefitted from the Moroccan shock for the simple reason that the two countries share the same comparative advantages and therefore each country benefits from the others' shocks.

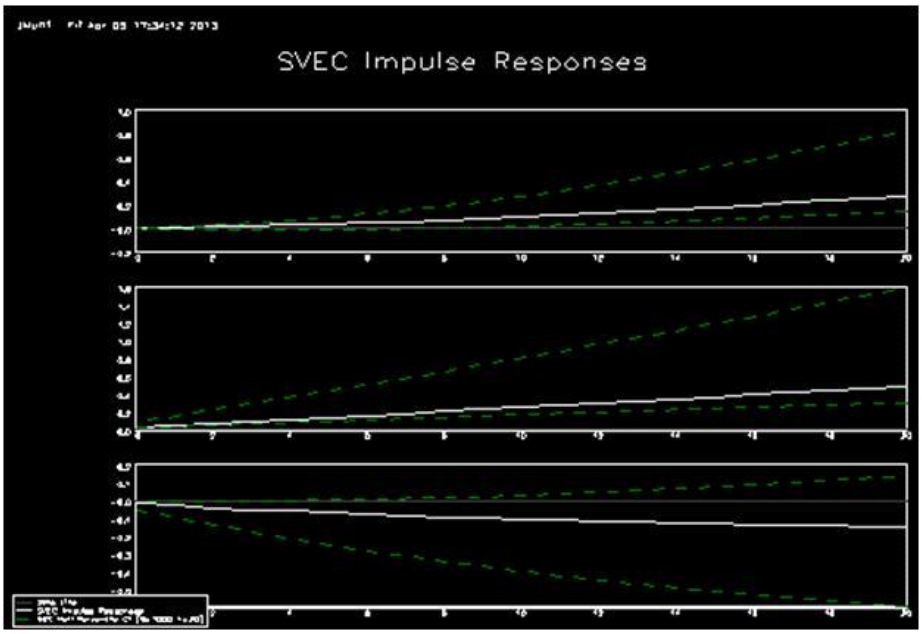

Figure 3 - Responses of GDP FR, GDP MOR and GDP TU (top to bottom) to the French growth shock (the first long term shock) with 95% Hall percentile bootstrap confidence interval based on 1000 bootstrap replications

5.1.2. Responses to short-term shock

By referring to figure (5), we note that the long-term effect of the Tunisian growth shock is positive and decreasing in France, Morocco and Tunisia. In addition, it seems that France benefits more from Tunisian shocks. This can be explained by the depth of economic interdependence (historically determined) between the two countries. Similarly, Morocco benefits from Tunisian shocks to the extent that, at the time of impact, the degradation of Tunisian productive sectors benefits Moroccan businesses, especially those which evolve in the competitive sectors (tourism, mechanical and electrical industry, food etc..). Table (4) summarizes all the results discussed above.

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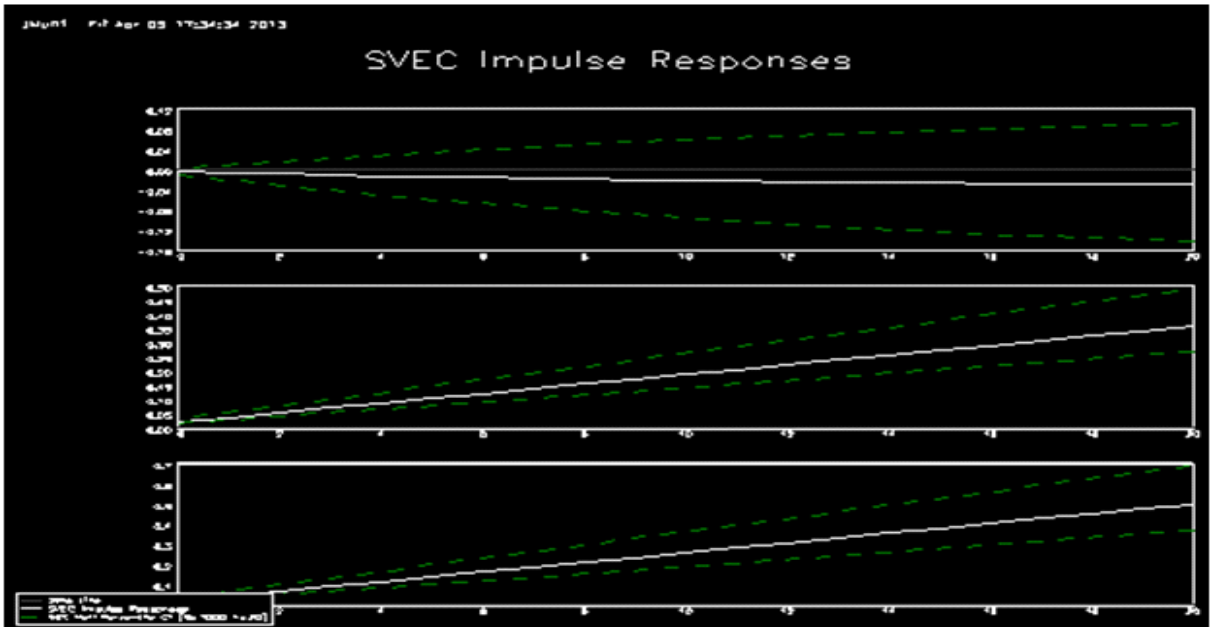

Figure 4 - Responses of GDP FR, GDP MOR and GDP TU (top to bottom)to the Morocan growth shock (the second long term shock) with 95% Hallpercentile bootstrap confidence interval based on 1000 bootstrap replications

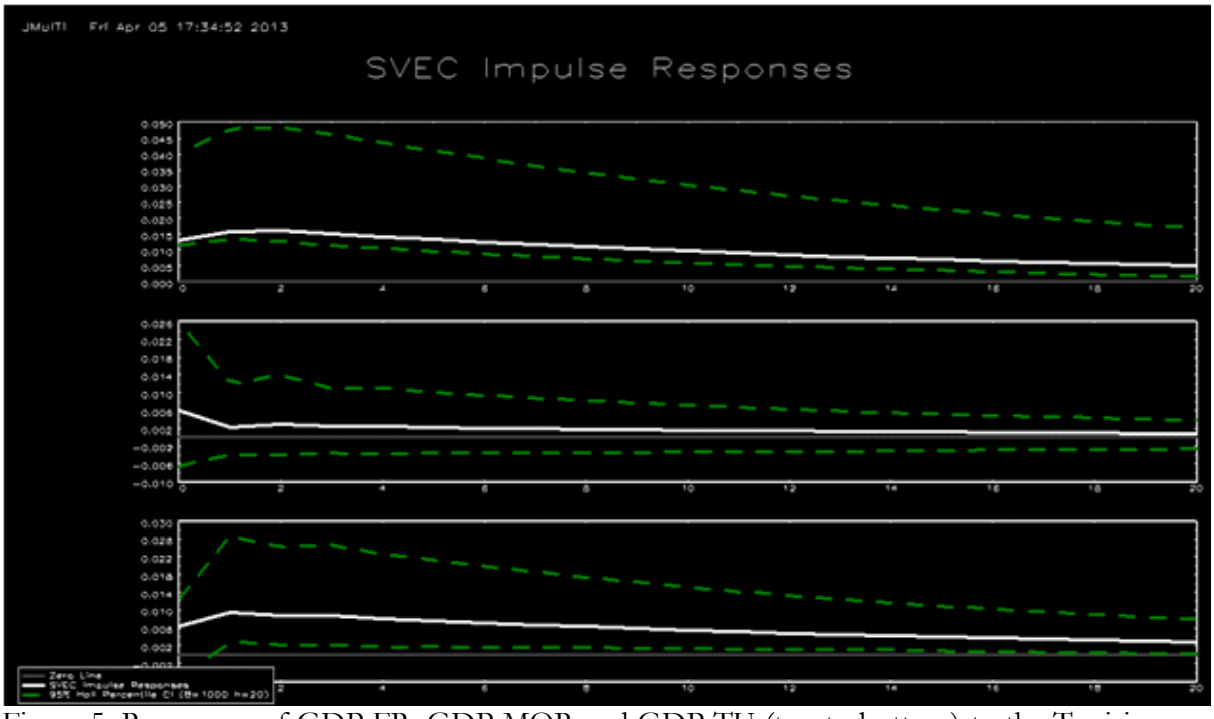

Figure 5: Responses of GDP FR, GDP MOR and GDP TU (top to bottom) to the Tunisian growth shock (the short term shock) with 95% Hall percentile bootstrap confidence interval based on 1000 bootstrap replications

Table 4 - 1st sub-model Impulse responses functions summary

Shocks	French response	Moroccan response	Tunisian response
France	( ) and increasing	( ) and increasing	( ) and increasing
Morocco	(–) and increasing	( ) and increasing	( ) and increasing
Tunisia	( ) and decreasing	Almost zero	( ) and increasing

5.1.3. Forecast error variance decomposition

From figure (6) we can note that the French shock is explained in the short and medium-term, by the same shock. However, in the long-term, the shock depends much more on the Tunisian shock. Thus, this confirms that France continues to solve its growth problems by exploiting opportunities that peripheral countries offer them.

It is also noted that the Moroccan shocks are largely dependent on France's growth, both in the short and long-term. This implies that the economic relationship between the two countries is strategic and has been built on inter-temporal decisions, orienting French companies towards the Moroccan market. This behaviour is explained by the incentive scheme, Morocco's economic policy and the fact that Morocco tried to be integrated into the Euro-Zone as a trade partner, especially given the comparative advantages that Morocco has compared to Algeria and Tunisia. Equally, it seems that this relationship is complementary rather than competitive which explains why, in the long-run, the shocks in Morocco are managed at all times by the Moroccan shock and in major part by the French shock.

In the case of Tunisia, we note that growth shocks are largely explained by French and especially Moroccan shocks. In other words, Tunisian growth is negatively correlated to Morocco. This is due to the similarity of their comparative advantages and economic structures which implies that each country benefits a lot, in terms of growth, from the other's loss. In the long-run, this situation becomes stronger and more and more confirmed.

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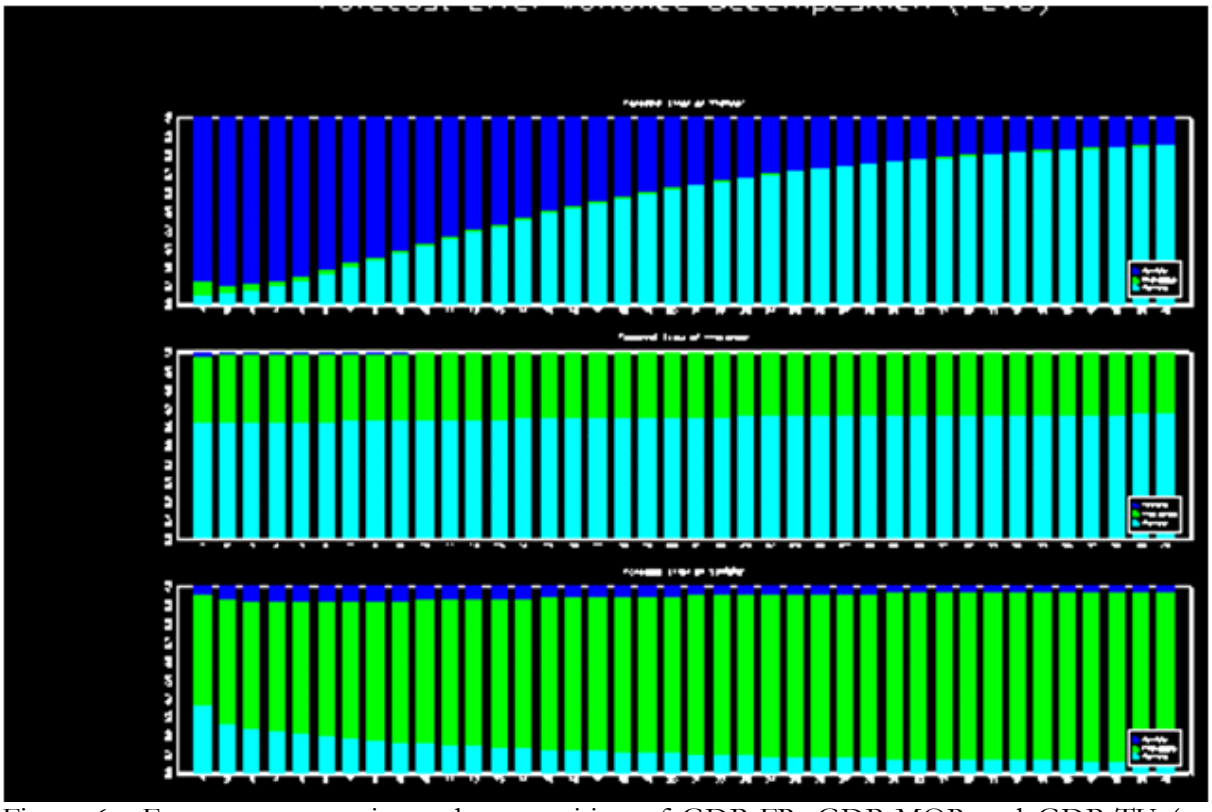

Figure 6 - Forecast error variance decomposition of GDP FR, GDP MOR and GDP TU (top to bottom) with relative contributions of French shock, Morocan shock and Tunisian shock

5.2. The second sub-model

As mentioned before, the second sub-model is a model that contains three long-term shocks and one short-term shock. Three restrictions are imposed to identify this model. The first two restrictions consider that the Venezuelan shock has no long-term effect on U.S. and Canadian growth. The third restriction expresses the absence of a long-term Canadian shock effect on Venezuelan growth.

5.2.1. Responses to long-term shocks

According to figure (7), it is clear that the long-term effects of the U.S. growth shock on the four countries in our sample vary significantly. Indeed, the effects are positive and increasing in the U.S., slightly positive and increasing in Canada, negative and decreasing in Cuba and almost zero in Venezuela. It is often noticed that the U.S. economy benefited in the long-run from its own, either positive or negative, shocks, as may be illustrated by the various important crises affecting this country (e.g. 1929, 1973, and 2008 which are cited as simple illustrations). Thus, can we say that the

Schumpeterian concept of "creative destruction" is still valid to explain the behaviour of the U.S. economy? The answer to this question is a priori positive given that the stylized facts have shown that such shocks are a major source of long-term expansion. Regarding the effect of the U.S.A's growth shock on Canada's growth, we note that despite its positivity, it is low. This goes against our intuition especially since both countries are highly integrated.

The long-term impact of U.S. growth on Cuban growth is negative and de-creasing which means that, despite the U.S. economic embargo on Cuba (in place since 1962), the Cuban economy is largely dependent on the U.S economy. This leads us to say that the USA and Cuba have a strange relationship. Indeed, it involves a hegemonic country (USA) having a conflict with a small country (Cuba), their relationship eventually establishing a tight embargo causing a developmental delay (this embargo was strengthened by the Helms-Burton enactment in 1996). However, the United States' role as the godfather of the Cuban economy in many sectors of the economy (because they satisfy the majority of their food imports, technology, etc..), allows us to say that the center countries are the first to penalize countries that do not share their ideological bases and the first to aim to benefit from all the opportunities that the underdeveloped countries offer.

The effect of a long-term impact of U.S. growth on Venezuelan growth is almost zero which means there is total economic independence between the two countries. This is explained by many reasons, primarily the political conflict between the two countries (the arrival of a socialist government in power since 1999), which has prompted Venezuela to seek new business partners in Latin America and elsewhere. Despite the fact that the U.S. growth shock did not have a significant effect on Canadian growth (Figure 7), we note from Figure (8) that the long-term effect of a Canadian growth shock on U.S. growth is positive and increasing. Thus, we can conclude at this stage of analysis that the U.S. economy immediately responded and reacted to the Canadian shock. In other words, we can say that NAFTA / NAFTA (North American Free Trade Agreement) has allowed the U.S. economy to benefit more in terms of growth. A priori, the Canadian degrowth is solved partly by the U.S economy's positive response (which benefits in terms of investment, production and capital flows).

Also, the Canadian shock had a positive and increasing effect on Cuban growth, which clearly shows the existence of trade flows between the two countries as well as a degree of interdependence, despite the economic embargo which the country was facing. However, no effect of that shock is recorded in Venezuela. The economic independence of the two economies may be explained by political considerations that are part of the logic of ideological conflicts (capitalism vs. socialism).

According to Figure (9), we note that the long-term effect of a growth shock in Venezuela is slightly positive and quasi-stationary in the U.S.A, slightly negative and stationary in Canada and positive and increasing in Cuba and Venezuela. The weak reactions of Canadian and American growth following a Venezuelan growth shock reflects the nature of the relationship between these two groups of countries that appears to be based on political and economic conflicts between two different and even opposing ideologies. Indeed, the willingness of some countries in Latin America to get rid of the U.S.A's hegemony and influence leads to the creation of new commercial zones that can counter the capitalist free trade zones. The integration of Canada and the U.S. into NAFTA, and of Venezuela into ALBA (Bolivarian Alliance for the Peoples of Our America) has created a degree of independence and/or economic dichotomy between members of these two zones.

5.2.2. Responses to short-term shock

Referring to Figure (10), we note that the short-term effect of the Cuban growth shock on American growth follows three phases. In the first, we notice that there is an immediate, negative and increasing effect until it reaches, at the end of the second period, its minimum level. In the second phase, the effect decreases, while in the third and final phase, the effect is cancelled. It follows from the above that the American response to the Cuban economy shock is subject to the principle of prudence (act within the limits allowed by policy constraints without, however, contributing to growth). The Canadian response is relatively worse than the American one. This is explained by the fact that Canada is one of the most important economic partners of Cuba (in addition to Argentina, China and Spain). Consequently, faced with the Cuban shock, the Canadian economy is affected by a loss of profits over time.

In the case of Cuba, we note that the short-term instantaneous effect of the Cuban growth shock on Cuban growth is decreasing, despite its positivity in the first period. Over the next three years, this effect is negative before being cancelled later. It follows from such information that Cuba is struggling to manage its own shocks, which depend, in large measure, on the outside especially the U.S. and Canada which are considered to be their most important trade partners.

Three basic ideas can be deduced from Table (5) which summarizes the in-formation discussed above relating to the second sub-model. Firstly, the growth impact of a hegemonic country (U.S) does not benefit any country including, amongst others, its traditional trading partners (Canada). Also a hegemonic country such as the U.S. benefits from its own shocks as well as from those which occur in other countries (Canada, Venezuela). Secondly, the Canadian growth impact benefits all other countries except Venezuela. However, this country benefits only from its own shocks. Thirdly, Cuba and Venezuela benefit mutually from their own shocks.

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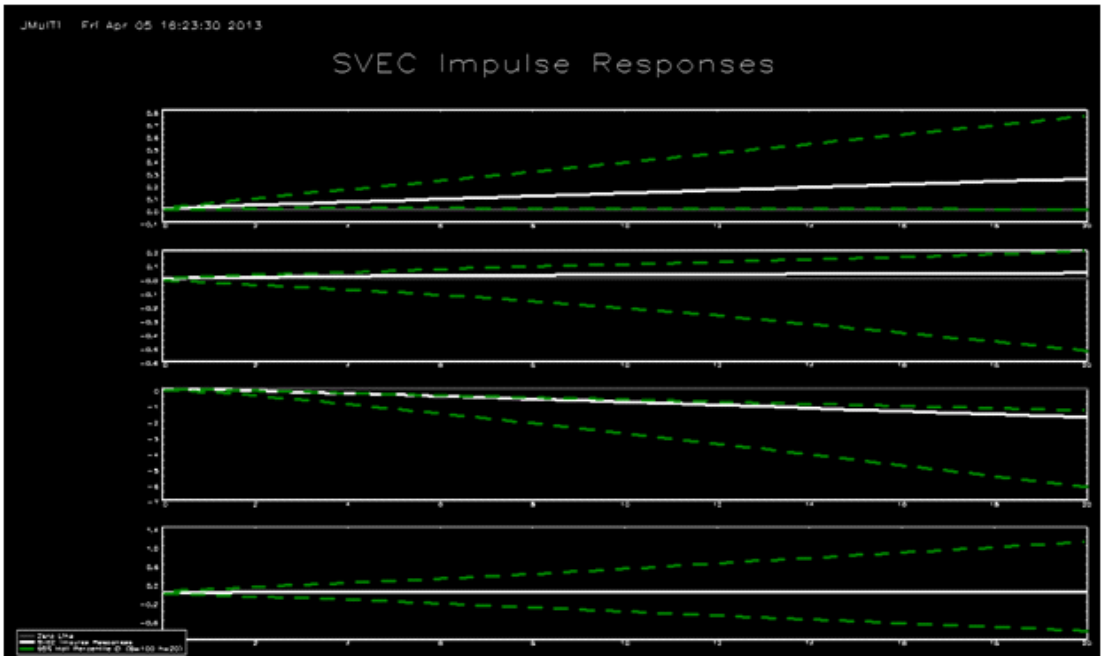

Figure 7 - Responses of GDP US, GDP CA, GDP VEN and GDP CUB (top to bottom) to the American growth shock (the first long term shock) with 95% Hall percentile bootstrap confidence interval based on 1000 bootstrap replications

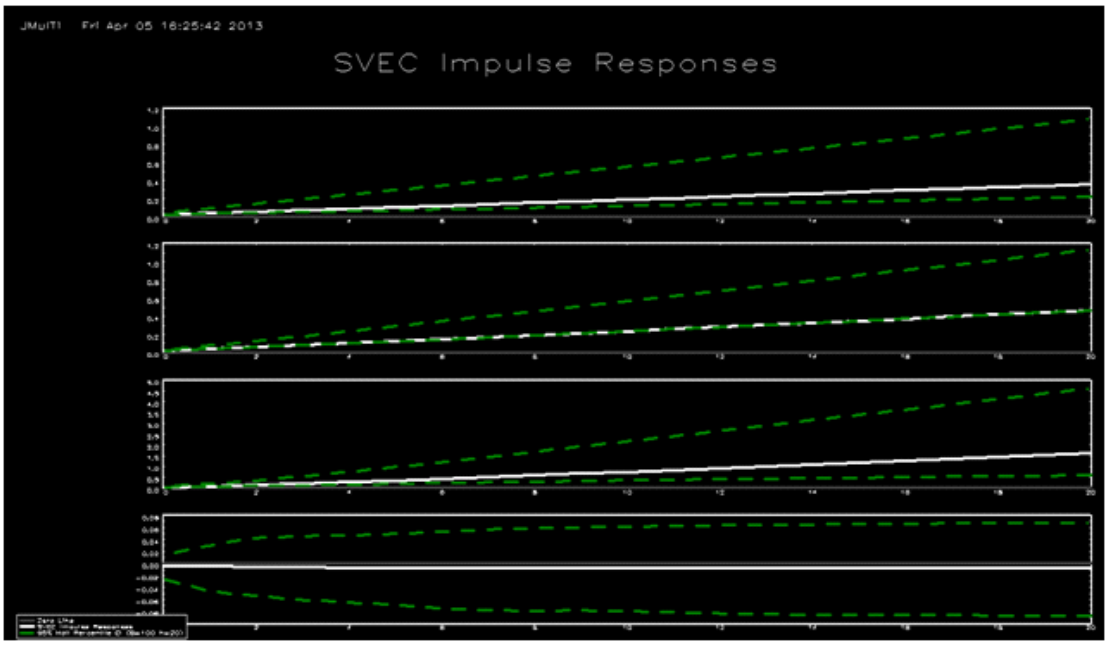

Figure 8 - Responses of GDP US, GDP CA, GDP VEN and GDP CUB (top to bottom) to the Canadian growth shock (the second long term shock) with 95% Hall percentile bootstrap confidence interval based on 1000 bootstrap replications

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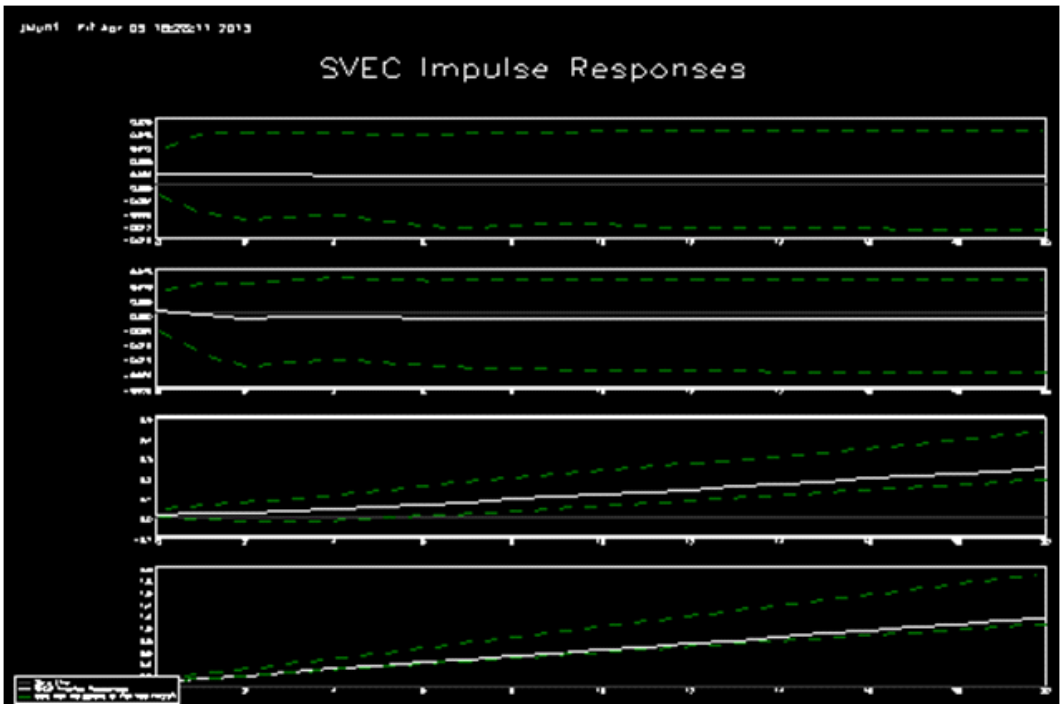

Figure 9 - Responses of GDP US, GDP CA, GDP VEN and GDP CUB (top to bottom) to the Venezuelan growth shock (the third long term shock) with 95% Hall percentile bootstrap confidence interval based on 1000 bootstrap replications

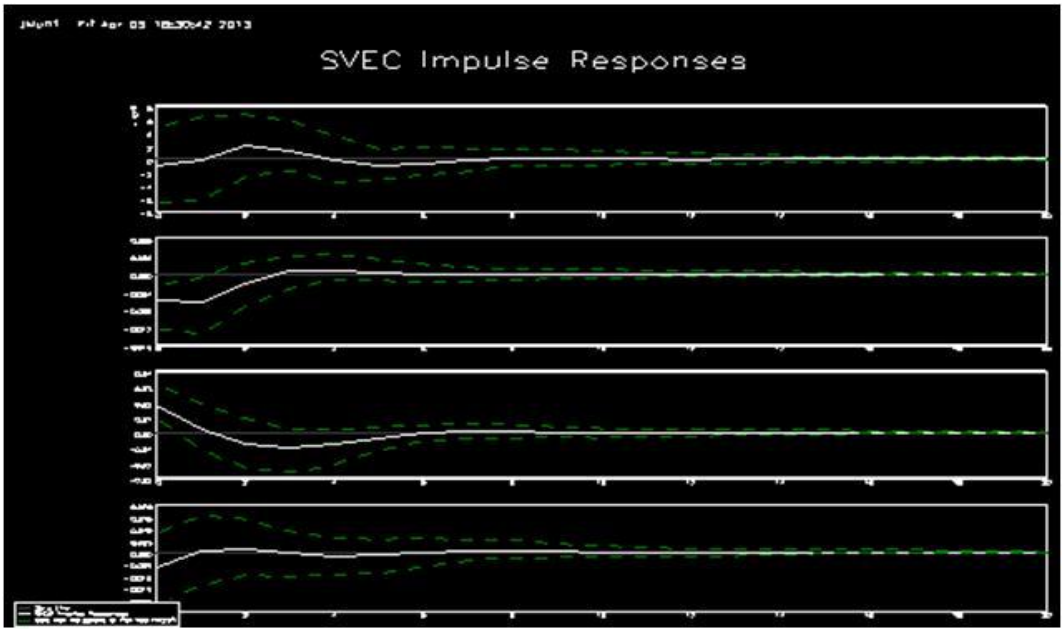

Figure 10: Responses of GDP US, GDP CA, GDP VEN and GDP CUB (top to bottom) to the Cuban growth shock (the short term shock) with 95% Hall percentile bootstrap confidence interval based on 1000 bootstrap replications

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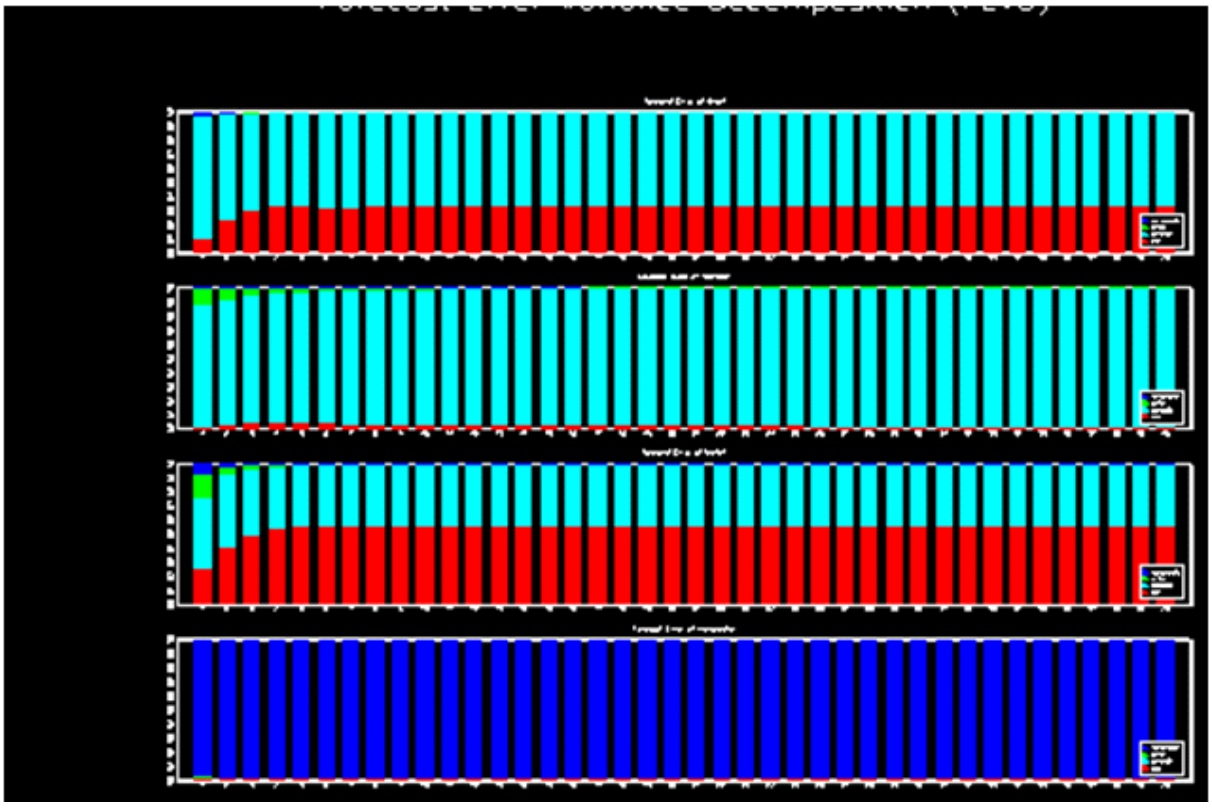

Figure 11 - Forecast error variance decomposition of GDP US, GDP CAN, GDP VEN and GDP CUB (top to bottom) with relative contributions of American shock, Canadian shock, Venezuelan shock and Cuban shock

Table 5- 2nd sub-model Impulse responses functions summary

Shocks	American response	Canadian response	Venezuelan response	Cuban response
U.S	(+) and increasing	Almost zero	Almost zero	(–) and decreasing
Canada	(+) and increasing	(+) and increasing	Almost zero	(+) and increasing
Venezuela	Slightly (+) and constant	Slightly (–) and constant	(+) and increasing	(+) and increasing

Cuba	(–) and increasing, (+) and decreasing and vanishes from the seventh period	(–) and increasing and vanishes from the third period	(+) and decreasing, (–) and increasing and vanishes from the third period	(–) and increasing and vanishes from the second period

5.2.3. Forecast error variance decomposition

According to Figure (11) associated with the forecast error variance decomposition of the second sub-model, we note that Canada is one of the major sources behind U.S. growth. Also, Canadian growth is largely dependent on the U.S. However, Venezuela is gradually in the process of becoming more and more independent because it has chosen to cooperate on an economic level with non-capitalist countries.

6. Concluding remarks

To conclude this paper, we can state that the development process is not totally dependent on the liberal theories stipulating that free exchange can instantaneously promote the growth of all trade partners. Indeed, behind apparent trade relations, there exists a balance of power that favours developed countries to the detriment of those developing. Our empirical study has showed that hegemonic countries, such as France and the U.S., benefit from their trade partners' shocks, especially those of the less developed.

The main results show that the peripheral countries integration into trade relations with center countries may allow short and medium term growth; it prevents them from confirming their long-term economic independence. Therefore, the policy implications of the paper are that the peripheral countries should base their growth on the creation of economic sectors with high added values. Also, they should rethinking their current integrations and build new trade relations with other peripheral countries far away of the power and the dominance of center countries.

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