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CORE AND PERIPHERY IN THE WORLD ECONOMY: AN EMPIRICAL ASSESSMENT OF THE INTEGRATION OF THE DEVELOPING COUNTRIES INTO THE WORLD ECONOMY

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In this paper a dynamic structural vector-autoregressive model is utilized to analyze the impact of shocks from the developed center (G-7) on the less developed periphery. Three possibilities emerge with less developed nations being negatively dependent on the center, positively integrated with the center, or independent of the center. A less developed country is classified as negatively dependent when shocks from the center have a negative impact and are relatively important in explaining variations in the output of the developing country. A less developed country is positively integrated if the shocks from the center have positive effects and explain a large share of the variation in output in the developing country. The results indicate that from the sample of eighty-six developed countries only five could be considered dependent, while the others are roughly equally divided into those positively integrated and those that are independent. [F02, F43, 050]

1. INTRODUCTION

There are several approaches to understanding the character of the global relationship between the developed and the developing world. Traditional economics, in particular neoclassical economics, argues that free trade in goods combined with the free flow of capital between the core and periphery will both promote the efficiency of resource utilization and enhance long-run economic growth in the latter. Thus the integration of less developed countries into the world economy through unhampered trade and capital flows will have positive effects.[1] The work of Amsden (1989) and Wade (1990) criticizes neoclassical economics for presuming that specialization according to existing comparative advantage and the flows of capital between nations can lead to long-term growth. They argue that the state must play an important role in promoting the dynamic development of comparative advantage. Thus integration in the international economy is essential to dynamic development of

[1]See, for example, the work of Krueger (1990, 1985).

the periphery, but this integration cannot be left to the free market, it must be guided by the state.

Structuralists see certain rigidities both within the economies of the periphery and in the structure of international relationships which inhibit the development of the periphery. Thus any benefits to be obtained through integration of the periphery into international trade and factor flows are likely to be significantly reduced as a result of the existence of these rigidities.[2] Therefore from this perspective, it is problematic as to whether the periphery gains from such integration.

A different view is provided in the work of dependency theorists.[3] Their views originate in political economy, their approach is historical, and it is generally pessimistic in assessing the possibilities of peripheral development within the context of the existing system of international relationships. According to Hirsch (1986) these theories stress the power basis of exchange relationships and argue that the more powerful distort the rules of exchange so as to benefit the powerful at the expense of the less powerful.

The optimism of the neoclassical view and the guarded optimism of the state centered view contrasts starkly with the pessimism of dependency. There have been attempts[4] to empirically test the implications of the dependency school of thought. These attempts have generally utilized regression analysis or related techniques to analyze the relationship between development (often measured by GDP per capita) and various measures of dependency (investment by multinationals). The results have been mixed. In this paper, a different approach is taken, we introduce a dynamic structural vector-autoregressive model with long-run restrictions which enables us to identify the effect of shocks originating in the center (developed countries) on the peripheral developing countries. This measure is then used to analyze the impact of integration into the international economy on less developed nations. Specifically, does this integration have negative or positive effects on developing nations?

The second section of this paper will briefly review the theoretical perspectives on integration into the world economy. The third section will introduce the model and the empirical methodology. Section four will discuss the data and its sources and then present the empirical results, while section five will summarize the paper and its major conclusions.

2. THEORETICAL BACKGROUND

As discussed in the introduction, neoclassical theory argues that integration of the periphery into the world economy will have positive effects on the periphery. From a comparative static framework, the arguments are quite familiar. Specialization

[2]See the work of Singer (1950) and Prebisch (1950).
[3]See the work of Frank (1979), Amin (1977), and Wallerstein (1974).
[4]See the work of Hirsch (1986).

according to comparative advantage allows a country to achieve both consumption and production gains. The latter stem from specialization in the production process while the former results from allowing consumers to purchase relatively cheaper products in international markets. Factor flows between countries are seen to also work in a way that promotes development in the periphery with capital moving from areas where it is relatively abundant (cheap) to areas where it is relatively scarce (expensive). However, these sorts of gains are one time gains which do not alter the long-run growth rate (level effects rather than growth effects).

As Edwards (1992) has shown, however, it is possible to construct dynamic models in which trade and factor liberalization have growth effects. For example, one can build models in which "those developing countries that are more integrated to the rest of the world will have an advantage in absorbing technological innovations generated in the advanced nations" (Edwards, 1992: 34). One might postulate that there is a learning by looking process at work where "the mere contact with newer commodities and technologies increases the efficiency with which innovations are absorbed" (Edwards, 1992: 34).

This view contrasts with that put forward by developmental state theorists (Wade, 1990 and Amsden, 1989). They argue that increasing returns characterizes a learning by doing process that applies to most manufactured good production. Thus if a peripheral nation is integrated into the international economy on the basis of unhindered trade and factor flows, it will likely find itself producing primary products for exports and importing manufactured goods. Thus comparative static gains from integration into international markets will be generated, but the overall growth rate will not increase and the transition to manufactured good exports will not occur. Instead, the state must seek to protect and subsidize selected industries, thus allowing these firms to engage in learning by doing. As a result, cost per unit will fall, the transition to manufactured exports can be achieved, and the rate of growth will increase. These theorists generally point to the experiences of East Asia as illustrations of the role which the state can play in successfully integrating peripheral countries into the international economy.

Although the neoclassical and state centered perspectives differ dramatically, there is at least one area of common ground. Both agree that integration into the international economy is a necessary condition for rapid growth of the periphery. They differ on the process by which this successful integration can be achieved. In contrast, the dependency school argues that integration into the international economy, however it is achieved, is likely to have negative effects on the periphery.

Dependency theorists argue that the economies of Third World countries have been shaped in response to conditions established by developed countries and thus their growth and development has been retarded and dependent. Theotonio Dos Santos (1993: 194) defines dependency in the following way:

> By dependence we mean a situation in which the economy of certain countries is conditioned by the development and expansion of another economy to which

> the former is subjected. The relation of interdependence between two or more economies, and between these and world trade, assumes the form of dependence when some countries (the dominant ones) can expand and can be self-sustaining, while other countries (the dependent ones) can do this only as a reflection of that expansion, which can have either a positive or a negative effect on their immediate development.

Thus the emphasis here is on the notion that independent growth and development are impossible for truly dependent economies. The implication is that this situation is harmful to the long-term development prospects of dependent countries, while the short-run effect can be positive.

The above idea characterizes the work of Andre Gunder Frank (1978). He argues that one can divide the world into countries of the center and countries of the periphery. The underdevelopment of the latter is the direct result of the development of the former. Most development economists have thought of underdevelopment as sort of the original state of nature for most societies and that development involves movement away from this original state. However, Frank believes that the state of underdevelopment is created in the periphery through the growth and expansion of the center.

The relationship of dependency between the center and the periphery is recreated within the periphery itself in terms of the relationship between metropolis areas and satellite areas. Rural satellite areas serve as sources of surplus which is then transferred to the city or metropolis which is in turn partly transferred out of the country to the center. Thus the relationship between center and periphery and metropolis and satellite is one in which exploitation occurs and provides a structure by which surplus is transferred from one geographical region to another. This siphoning of surplus away from satellite areas and peripheries is what makes long-term development in these areas unlikely.

The actual mechanics for exploitation comes in several different forms. The monopolistic powers of the center countries allow them to raise the prices of their exports relative to the prices of periphery exports. In addition, the center also possesses monopsony power with respect to purchases of export products from the periphery which allows them to push down these prices. The net result is that the terms of trade are turned against the periphery and this in effect causes a transfer of surplus. In addition, the activities of multinational corporations also provide a mechanism for surplus extraction. This may occur through the repatriation of profits which represents a transfer of potential surplus value out of the periphery. Finally, multinational corporations which draw out large quantities of capital from national capital markets are in fact crowding out domestic investors. Since the domestic investor would most likely have invested in projects within the country, this also proves to serve as an obstacle to overall development.

The above discussion, limited as it is, gives the reader some feel for the main ideas proposed by the dependency theory school of thought. Some theorists of the school

eschew empirical testing of the theory altogether. They argue that the relationships are qualitative rather than quantitative and thus impossible to measure quantitatively. However, a number of scholars have sought to empirically test the propositions and implications of dependency theory. Most of these attempts have involved using regression analysis, usually using as the independent variable dependence (on trade, capital, foreign aid) and as the dependent variable the development or the inequality in the society. The results are mixed at best. There is some evidence that less developed countries that are strongly reliant on exporting raw materials and importing processed goods or that suffer from severe export commodity concentration and/or trade partner concentration do indeed demonstrate greater income inequality and/or grow more slowly (Alschuler, 1976; Galtung, 1971; Rubinson, 1977). However, there are other studies that contradict or are much less supportive of these ideas (Bradshaw, 1985a, 1985b; Delacroix, 1977; Weede and Tiefenbach, 1981a, 1981b). There is some evidence that foreign investment dependence or penetration by multinational companies have negative effects on economic growth and inequality (Bornschier 1980). However, there are other studies that contradict these results (Firebaugh and Beck, 1994).

The main intention of this paper is to take a different empirical approach by utilizing a dynamic structural vector-autoregressive model to analyze the impact of shocks from the center to the periphery. No attempt will be made to describe or analyze the channels through which developed countries affect the Third World and no attempt will be made to analyze the effect of dependency on income distribution in the periphery.

3. MODEL

In a textbook approach, a typical open economy is subject to demand and supply shocks. Demand shocks reflect changes in taxes, monetary expansion or contraction, or changes in tastes. It is usually assumed that demand shocks have short-run and medium-run effects on real output, but not long-run effects. Supply shocks (productivity shocks, bad harvest, etc.) are typically assumed to have short-, medium- and long-run effects on the real output. In the context of open economies such shocks could also be classified into foreign (world) supply shocks and home country (domestic) supply shocks. Our model follows this simple approach.

Consider a dynamic system where the true model could be represented by an infinite moving average representation of a vector of variables and a vector of exogenous shocks as follows:

$$\Delta y_t^c = a_1(L)u_t^c + a_2(L)u_t^p + a_3(L)u_t^d \quad (1a)$$

$$\Delta y_t^p = b_1(L)u_t^c + b_2(L)u_t^p + b_3(L)u_t^d \quad (1b)$$

$$\Delta p_t^p = \varphi(L)u_t^c + \varphi(L)u_t^p + c_3(L)u_t^d. \quad (1c)$$

In these equations, y_t^c represents real output of a core countries, y_t^p is an output of a periphery country, p_t^p is the price level of a periphery country, u_t^c is a structural supply shock originating from the core countries, u_t^p is a country specific structural supply shock originating from a periphery country, u_t^d is a country specific demand shock originating from a periphery country, Δ is a first-difference operator, and $a_i(L)$, $b_i(L)$, $c_i(L)$ are polynomials in the lag operator L.[5] The above model can be rewritten in a more compact form as

$$\Delta x_t = A(L)u_t, \quad (2)$$

where $\Delta x_t = [\Delta y_t^c, \Delta y_t^p, \Delta p_t^p]'$ and $u_t = [u_t^c, u_t^p, u_t^d]'$.

Model (1) is a structural moving average model where y_t^c, y_t^p, p_t^p are observable variables and u_t^c, u_t^p, u_t^d are exogenous shocks which cannot be directly observed. Rather, the exogenous shocks are observed through their effects on components of the vector Δx_t. A structural vector auto-regressive representation of (2) can be obtained by inverting $A(L)$ to get

$$\Phi(L)\Delta x_t = u_t \quad (3)$$

where $\Phi(L) = \Phi_0 - \sum_{k=1}^{\infty} \Phi_k L^k$. Thus

$$\Phi_0\Delta x_t = \Phi_1\Delta x_{t-1} + \Phi_2\Delta x_{t-2} + \ldots u_t \quad (4)$$

or

$$\Delta x_t = C_1\Delta x_{t-1} + C_2\Delta x_{t-2} + \ldots + C_p\Delta x_{t-p} + e_t, \quad (5)$$

[5]In equations 1a and 1b, shocks from the center (u_t^c) are assumed to influence the output in both the center and periphery. These are supply shocks such as changes in preferences, technology, productivity, the labor market, and investment. Demand shocks (monetary and financial) are excluded since it is presumed that such shocks have no long-run impact on output.

where $C_i = \Phi_0^{-1}\Phi_i$ for $i = 1, 2, ..., p$ and $e_t = \Phi_0^{-1}u_t$.
Since the elements in the Δx_t are assumed to be stationary, (5) can be written as a moving average representation

$$\Delta x_t = e_t + B_1 e_{t-1} + B_2 e_{t-2} + \ldots = B(L)e_t. \tag{6}$$

The question naturally is whether the structural parameters from (5) will make the system identifiable,[6] in other words, can we obtain from (5) the structural parameters for (1). Normalization of the diagonal elements of Φ_0 to unity leaves us with $n(n-1)$ restrictions which must be imposed based on some theoretical considerations. After Sims (1980) critique of imposing zero restrictions, as was typical in simultaneous equation models, the usual way to go is to assume that the exogeneity of disturbances implies that the covariances between different shocks equal zero, thus $\text{corr}(u_t^c u_t^p) = 0$, $\text{corr}(u_t^c u_t^d) = 0$, and $\text{corr}(u_t^p u_t^d) = 0$. This leaves us with $n(n-1)/2$ restrictions. Sims (1980) suggested relying on the Choleski decomposition which produces results dependent on the ordering of variables in the vector Δx_t. This restriction, while advisable in certain situations, is generally considered to be inadequate (Cooley and LeRoy, 1985) and inferences from such an identification procedure could be misleading (Darnell, 1994, p. 423). In this paper, a different identification scheme is used, one based on the summary of long-run impulse responses as proposed first by Blanchard and Quah (1989) and consequently applied in a variety of papers, among others Ahmed, et al. (1993), Bayoumi and Eichengreen (1992), etc. This identification procedure is outlined below.

In our case three long-run restrictions are assumed. First, assume that country specific supply and demand shocks of the periphery countries have no long-run impact on the real output of the countries of the core.[7] This could be expressed as

$$\begin{aligned} \lim_{k\to\infty} \frac{d(y^c_{t+k})}{d(u^p_t)} &= \sum_{k=0}^{\infty} a_{2,k} = 0 \\ \lim_{k\to\infty} \frac{d(y^c_{t+k})}{d(u^d_t)} &= \sum_{k=0}^{\infty} a_{3,k} = 0 \end{aligned} \tag{7}$$

[6]For an excellent discussion see Watson (1994).

[7]This restriction seems quite reasonable since there is no systematic theory which would indicate that the real output of large developed countries is in the long-run determined by disturbances emanating from smaller, less developed countries.

This leaves the last restriction that in the long-run the effect of domestic demand shocks in periphery countries do not affect their long-run output (the long-run supply curve is vertical). Thus similar to the above restrictions

$$\lim_{k \to \infty} \frac{d(y^p_{t+k})}{d(u^d_t)} = \sum_{k=0}^{\infty} b_{3,k} = 0. \tag{8}$$

This restriction then means that $A(1)$ is lower triangular and thus also $B(1)$ is lower triangular, which will allow us to identify the parameters in $A(L)$, since $A(1) = B(1)A_0$.

What can this model tell us about the effect which core countries have on the output of periphery countries? The short-run, medium-run, and long-run effects of exogenous shocks originating from core countries on the output of periphery country is hidden in the behavior of the polynomial $b_1(L)$. More precisely, the effect of the one unit of exogenous shocks coming from core countries on the level of output of a periphery country through k years is given by

$$\frac{d(y^p_{t+k})}{d(u^c_t)} = \sum_{k=0}^{i} b_{1,k}, \tag{9}$$

where k could be chosen for a short-run period of one year, for a medium-term period, say three to five years, and a long-run period of say 10 or 20 years. The path of the $b_{1,k}$ from (9) describes the typical response (and the optimal linear forecast) of the y^p_t to a normalized innovation u^c_t. Since u^c_t is not correlated with u^p_t and u^d_t by construction it follows that $b_{1,k}$ is the pure response of output in the periphery to a shock originating from the core alone. If the sum is negative, the fear of dependency theorists would be confirmed, shocks coming from the core decrease the level of output in the periphery countries.

The model also helps to answer another question. What is the weight of domestic and foreign factors in determining domestic output? In other words, even if the effect of shocks originating from the core countries on the periphery country is negative, the impact would be small if such effects play a small role in determining variations in output in the periphery. Thus one must be able to assess the relative importance of these shocks. This could be obtained in the following way:

$$\frac{\sum_{k=0}^{i} b_1^2}{\sum_{j=1}^{n} \sum_{k=0}^{i} b_{j,k}^2}, \tag{10}$$

where *n* represents the number of sources of shocks. In this case n would be three. The three types of shocks are: supply shocks originating in the core and impacting on a peripheral nation, supply shocks within the peripheral nation, and demand shocks within the peripheral nation. Thus equation (10) indicates the proportion of variation in output for a particular peripheral nation which is the result of shocks emanating from the core.

From the above analysis one can then construct the following classification system. Countries can be thought of as dependent if the cumulative sum in equation (9) is negative and if the variance decomposition in equation (10) indicates shocks from the center explain forty percent (or more) of the total variation in the output of the periphery country. Second, countries can be thought to be strongly, positively integrated into the world economy if the cumulative sum in equation (9) is positive and if the variance decomposition in equation (10) indicates that shocks from the center account for forty percent or more of the total variation in output in the peripheral countries. Finally, one can classify peripheral countries as being independent of the core if the cumulative sum in equation (9) is positive or negative and the variance decomposition in equation (10) indicates that shocks from the center explain less than forty percent of the variation in output in the peripheral countries. Of course the designation of forty percent as the cutoff point is arbitrary, but it will give some indication of the relative importance of shocks from the center.

There are a number of important questions which, of course, the above model cannot answer. One could ask whether a small, unindustrialized country of the periphery could gain from belonging to the system where core countries dominate? "It may do so in the narrow sense that its income is likely to be higher than it would otherwise be, but at the cost of structural dependence; proximity brings dangers of subjection to economic, military and cultural hegemony" (Seers, 1979: xviii). Our model measures only the effect of the interaction of the periphery economy with the core countries on the real income of periphery countries. Naturally, important points of hegemony and other qualitative characteristics could not be assessed by this model. Second, this study cannot measure the impact of core countries on economic inequality within the periphery countries and through this on growth.

4. EMPIRICAL ANALYSIS

The core countries are assumed to be the G-7 countries: United States, Japan, United Kingdom, Germany, France, Canada, Italy. The total output of these countries represents approximately eighty percent of the output of the OECD. The periphery countries are assumed to include most of the countries of South and Central America, Africa, and Asia for which data were available.[8] The data utilized for the G-7 and

[8]These were the following eighty-seven countries: Algeria, Argentina, Bahamas, Bangladesh, Barbados, Belize, Benin, Bermuda, Bolivia, Botswana, Brazil, Burkina Faso,

periphery countries was drawn from World Bank sources and included information on real Gross Domestic Product (GDP) and the GDP deflator. The time period extended from 1960 to 1992.

For each nation the results from equations (9) and (10) above were generated.[9] If the reader will remember, equation (9) shows the effect of a one unit exogenous shock coming from the core countries (G-7) on the level of output of the periphery country under consideration. By setting *k,* the number of lags, one can see the cumulative impact through the specified number of periods.[10] The key factor here is the sign attached to equation (9) through the years. If it is negative, then this implies that shocks emanating from the core reduce the level of income of the country under consideration. The following countries exhibited this characteristic: Bahamas, Bangladesh, Belize, Benin, Botswana, Burkina Faso, Cameroon, Chad, Chile, the Congo, India, Indonesia, Lesotho, Malaysia, Mauritius, Myanmar, Nepal, Paraguay, Rwanda, Senegal, the Seychelles, Singapore, Sri Lanka, the Sudan and Tunisia. There were several other countries for which there were negative impacts for the short-run, but these disappeared as the time period increased.

In order to determine the relative importance of these results, the variance decomposition for each country, as illustrated in equation (10), was examined. Equation (10) allows one to determine the extent to which variations in output in the periphery were the result of shocks emanating from the core. These results are especially important for those nations listed above for which the shocks emanating from the core had a negative impact on output. For even if shocks from the core had a negative impact on a country's output, this may not be of great importance if such

Burundi, Cameroon, Central African Republic, Chad, Chile, Columbia, Congo, Costa Rica, Dominica, Dominican Republic, Egypt, El Salvador, Ethiopia, Fiji, Gabon, Gambia, Ghana, Guatemala, Guyana, Haiti, Hondouras, Hong Kong, India, Indonesia, Iraq, Israel, Ivory Coast, Jamaica, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Mali, Mauretania, Mauritius, Mexico, Morocco, Myanmar, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Puerto Rico, Rwanda, St. Vincent, Senegal, the Seychelles, Singapore, Somalia, South Africa, South Korea, Sri Lanka, Sudan, Swaziland, Tanzania, Thailand, Togo, Tunisia, Turkey, Trinidad, Uruguay, Venezuela, Zaire, Zambia, and Zimbabwe.

[9]The statistical analysis of the data is not reported here. First, using the Ljung-Box test two lags are used in equation (5). Two lags were chosen to achieve symmetry in capturing the dynamic effects of the model. Second, the augmented Dickey-Fuller test was performed with a constant and a trend where lags were calculated according to Akaike information criteria. In more than ninety percent of the results unit roots in the data were confirmed. Third, the Engle-Granger and Johansen's test for cointegration were performed. The results were rather mixed. Again, to have symmetry the VAR estimation was carried out in the first log differences.

[10]For all of the calculations the vector moving average representation of the VAR is truncated at thirty-six periods. Similarly, impulse responses and variance decompositions are calculated for thirty-six periods. However, the results usually change little after ten or twelve periods.

shocks only accounted for a small part of the variation in output in a peripheral country.

The results of the variance decomposition for the countries for which equation (10) was negative are presented in Table 1. In the long-run (ten years or more) the variation in output due to shocks from the core was five percent or less for the Bahamas, Bangladesh, Belize, Benin, Chad, Chile, Lesotho, Myanmar, Paraguay, Rwanda, and Singapore. In addition, for Cameroon, India, Senegal, and the Sudan, the variation in output accounted for by shocks from the core was, for the most part, ten percent or less. Thus for this group of countries, the main source of variation in output was domestic, not foreign in nature.

Table 1. Countries of the Periphery Which Were Negatively Effected by Shocks from the Center

Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]			Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]		
	1 year	4 years	10 years		1 year	4 years	10 years
Bahamas	0.11	1.14	1.51	Bangladesh	0.27	2.30	1.83
Belize	39.89	0.04	0.47	Benin	4.61	3.19	1.67
Botswana	33.22	48.60	52.30	Burkina Faso	2.40	32.0	45.82
Cameroon	19.37	9.76	10.11	Chad	6.92	1.17	0.02
Chile	26.98	1.79	0.02	Congo	27.38	17.63	13.77
India	10.72	2.10	7.70	Indonesia	36.20	61.64	53.60
Lesotho	5.88	0.46	3.55	Malaysia	15.65	42.64	39.75
Mauritius	17.62	37.97	53.49	Myanmar	0.07	3.17	4.38
Nepal	4.91	14.33	16.68	Paraguay	7.96	4.94	0.17
Rwanda	23.9	10.53	0.12	Senegal	22.86	26.59	6.91
Seychelles	34.24	29.28	29.85	Singapore	5.12	4.40	3.26
Sri Lanka	0.75	4.89	19.22	Sudan	7.02	5.91	5.19
Tunisia	6.81	16.65	11.95				

Note: [1]The three columns are the results of the variance decomposition of the variation in the domestic output of the periphery countries. Only the results due to shocks from the core are reported; equation (10). The complete results, including the share of the domestic supply and the domestic demand shocks are available from the authors.

For Nepal, Sri Lanka, Tunisia, and the Congo, the variation in output accounted for by shocks from the core ranged from ten to twenty percent, while for the

Seychelles, the variation was approximately thirty percent. Thus this group of countries was moderately influenced by shocks emanating from the center.

Lastly, there is a group of nations for which shocks from the center greatly influenced variations in output. Specifically, for Botswana, Burkina Faso, Indonesia, Malaysia, and Mauritius the variation in output accounted for by shocks from the core was in the forty to fifty percent range. Thus this last group of nations represents those for which output variations are substantially influenced by shocks from the center and these shocks have a negative impact on output. In terms of the classification scheme outlined in Section Three, these countries are dependent. From this perspective, dependency relationships would seen to characterize a very few nations.

Table 2. Countries Positively Integrated Into the World Economy

Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]			Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]		
	1 year	4 years	10 years		1 year	4 years	10 years
Argentina	14.29	54.55	60.89	Barbados	8.01	33.46	49.85
Bermuda	1.05	41.04	70.50	Bolivia	28.19	37.26	52.91
Brazil	3.15	37.69	67.69	Burundi	34.86	43.78	42.96
Costa Rica	24.97	53.42	53.86	Ivory Coast	85.88	92.78	84.59
El Salvador	66.03	50.40	51.76	Ethiopia	15.22	63.52	59.11
Ghana	11.19	36.40	39.41	Guatemala	36.37	44.05	40.14
Guyana	51.76	69.72	74.68	Israel	0.58	44.16	60.40
Jamaica	10.07	36.07	91.20	Kenya	2.48	39.84	50.42
Liberia	72.16	92.81	93.00	Libya	82.09	81.62	88.87
Madagascar	6.43	60.82	58.72	Malawi	9.41	51.39	50.71
Mauritania	20.68	60.97	68.33	Mexico	0.00	28.30	49.75
Nicaragua	32.43	46.16	45.27	Papua N.G.	31.45	94.40	85.68
Puerto Rico	38.14	80.36	77.42	St. Vincent	42.95	44.83	55.28
South Africa	16.34	37.0	66.83	Swaziland	2.74	27.17	52.35
Tanzania	42.89	62.11	67.15	Togo	18.37	81.46	78.14
Turkey	1.68	42.34	65.10	Zaire	10.22	47.98	54.38
Zambia	0.13	20.83	65.79	Zimbabwe	0.68	9.68	59.85

Note: [1]The three columns are the results of the variance decomposition of the variation in the domestic output of the periphery countries. Only the results due to shocks from the core are reported; equation (10). The complete results, including the share of the domestic supply and the domestic demand shocks are available from the authors.

A second group of countries was also identified. For this group of countries the sign for equation (9) is positive, implying that shocks from the center have positive impacts, and the variance decomposition indicated that these shocks accounted for forty percent or more of the variation in output. These countries were characterized as being strongly, positively integrated into the world economy.

Using this criteria the following results emerge. There are a large number of countries for which shocks from the center account for fifty percent or more of the variation in output in the long-run (ten years). These countries are: Argentina, Barbados, Bermuda, Bolivia, Brazil, Costa Rica, Ivory Coast, El Salvador, Ethiopia, Guyana, Israel, Jamaica, Kenya, Liberia, Libya, Madagascar, Mauretania, Mexico, Papua New Guinea, Puerto Rico, St. Vincent, South Africa, Swaziland, Tanzania, Togo, Turkey, Zaire, Zambia, and Zimbabwe. Then there is another group for which the variation explained by shocks from the center ranges from forty to fifty percent. These countries are: Burundi, Ghana, Guatemala, Malawi and Nicaragua. These results are presented in Table 2. Using this approach then indicates that a significant part of the developing world is, given the classification scheme outlined in Section Three, positively integrated into the world economy.

The final group of countries to be discussed are those which are classified as independent. For this group of countries, shocks from the center have either a positive or negative effect on output. However, such shocks explain less than forty percent of the variation in the country's output. There are forty-eight of these countries and they are listed in Table 3.

Table 3. Independent Countries

Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]			Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]		
	1 year	4 years	10 years		1 year	4 years	10 years
Algeria	6.29	13.67	10.92	Bahamas	0.11	1.14	1.51
Bangladesh	0.27	2.30	1.83	Belize	39.89	0.04	0.47
Benin	4.61	3.19	1.67	Cameroon	19.37	9.76	10.11
Central Africa	5.30	15.14	11.27	Chad	6.92	1.17	0.02
Chile	26.98	1.79	0.02	Colombia	3.35	2.50	29.94
Congo	27.38	17.63	13.77	Dominica	27.87	2.59	3.87
Dominican R.	0.30	9.39	19.66	Egypt	0.21	0.29	0.95
Fiji	4.29	6.01	8.58	Gabon	5.33	1.08	0.59
Gambia	0.17	7.29	14.50	Haiti	0.24	1.32	2.29
Honduras	18.74	9.46	5.95	Hong Kong	0.46	15.46	16.22

Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]			Country	Short-run and Long-run Importance of Shocks from the Center in the Variation of the Output in the Periphery[1]		
	1 year	4 years	10 years		1 year	4 years	10 years
India	10.72	2.10	7.70	Iraq	19.82	25.43	24.39
Korea	31.19	15.17	6.68	Lesotho	5.88	0.46	3.55
Mali	17.66	12.91	13.67	Morocco	0.01	2.71	4.21
Myanmar	0.07	3.17	4.38	Nepal	4.91	14.33	16.68
Niger	5.84	9.81	15.89	Nigeria	0.23	0.92	0.06
Oman	12.56	19.62	27.93	Pakistan	0.98	10.09	10.02
Panama	1.96	9.44	19.94	Paraguay	7.96	4.94	0.17
Peru	4.94	44.14	36.93	Philippines	0.71	6.02	10.64
Rwanda	23.9	10.53	0.12	Senegal	22.86	26.59	6.91
Seychelles	34.24	29.28	29.85	Singapore	5.12	4.40	3.26
Somalia	9.31	32.79	20.55	Sri Lanka	0.75	4.89	19.22
Sudan	7.02	5.91	5.19	Thailand	4.66	6.66	7.25
Trinidad	0.35	6.21	5.05	Tunesia	6.81	16.65	11.95
Uruguay	11.58	3.91	15.68	Venezuela	35.68	23.11	6.91

Note: [1]The three columns are the results of the variance decomposition of the variation in the domestic output of the periphery countries. Only the results due to shocks from the core are reported; equation (10). The complete results, including the share of the domestic supply and the domestic demand shocks are available from the authors.

5. SUMMARY AND CONCLUSIONS

In this paper an attempt has been made to empirically analyze the impact on less developed countries of integration into the world economy. In order to carry out the analysis, a dynamic structural vector-autoregressive model was used to identify the shocks from the center affecting output in developing countries. For each developing country, these shocks were classified into domestic supply and demand shocks and exogenous shocks coming from the developed center. The results were used to determine whether the latter- type of shocks, emanating from the center, had a positive or negative effect on output in the peripheral (developing) nations. Finally, variance decomposition was used to determine the proportion of the variation of the output of each developing nation which was due to shocks from the developed center.

The G-7 countries of the OECD were assumed to represent the developed core

with a wide variety of nations from South and East Asia, Africa, South and Central America, and the Caribbean assumed to represent the periphery. The data on real GDP and prices was drawn from World Bank data sources.

If dependent countries are developing nations that are harmed by increases in output in the center, harmed in the sense that output in the developing countries declines, then the results indicate that there are only a few countries for which this is true. In other words, there are only a few countries where shocks from the center dominate variations in output and the shocks have a negative impact on the output of the developing nation. These countries were: Malaysia, Indonesia, Botswana, Burkina Faso, and Mauritius. These countries were classified as dependent and from this perspective dependency would seem to be a quite limited phenomenon.

A second much larger group of countries was also identified. These countries were found to be strongly integrated into the world economy. However, shocks from the center were found to have positive effects on this group of countries. Thus growth in the center would seem to promote expansion of the periphery. These nations were characterized as being strongly positively integrated into the world economy.

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