

**EXPORT REVENUES AS DETERMINANTS OF ECONOMIC GROWTH:  
EVIDENCE FROM BOTSWANA**

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The author is a Lecturer at the University of Botswana. This article draws some of its material from my PhD Thesis entitled 'Export Promotion in a Small Mineral-based Economy: the case of Botswana,' completed in 2000 at the University of Strathclyde, Glasgow, Scotland. In this regard I have benefited from comments from my Supervisor, Professor Jim Love, Dean of the Business School at the University of Strathclyde. I am also grateful to Dr. H. K. Siphambe of the Department of Economics, University of Botswana, for some useful comments on an earlier version of this article. Otherwise, I own responsibility for the whole work and its quality.

# EXPORT REVENUES AS DETERMINANTS OF ECONOMIC GROWTH:EVIDENCE FROM BOTSWANA

Dr. JOEL SENTSHO

## Abstract

*The objective of this paper is to assess whether export revenues derived from an 'enclave sector' like the case of mining in Botswana, can lead to significant and positive economic growth in a country. The paper uses both statistical data and time series econometric analysis to test the causal relationship between exports and economic growth. The results indicate that primary export revenues have led to positive and significant economic growth in Botswana. Thought important, this result should be seen as a transition strategy towards long term economic growth based on manufactures and services as the main engines of growth.*

## 1. INTRODUCTION

Export-led growth (ELG) is an economic development strategy in which export, and foreign trade in general play a central role in a country's economic growth and development. There has been a general global shift towards the ELG strategy in recent years. This change has been found to be due to the actual and potential economic benefits this strategy accords to both developing and developed countries alike. First, export growth is said to result in increased output, employment and consumption, all of which lead to an increase in the demand for a country's output (Jung and Marshall, 1985). Furthermore, a buoyant export sector enlarges the domestic market so that firms achieve economies of scale and thus lower unit costs. This may be expected because an export sector allows a country to trade along its lines of comparative advantage, specializing not only in commodities that use its abundant factors intensively, but also where its per unit costs are lower (Tyler, 1981:127). This generally leads to efficient resource allocation. This efficiency is further enhanced by exposure to international competition which forces firms to adopt modern technology and produce quality products that meet the demands of sophisticated consumers in international markets (Mayer, 1995).

Second, trade may also benefit a country with positive export externalities which lead to increased productivity and economic growth (Bradford, 1994; Feder, 1983; Sengupta, 1990; and Sengupta and Espana, 1994). Furthermore, trade may help a developing country to overcome the ax-ante saving-investment gap and the ax-ante import-export gap by providing the necessary foreign exchange for development (Chenery and Strout 1966; Wilbur and Haque, 1992). Moreover, countries engaged in trade are thought to be more able to respond to and weather unfavourable external shocks than those following the inward-looking development strategy (Balassa, 1984).

These benefits of the ELG strategy have led, not only to the adoption of this strategy by many countries, but also to a mushrooming of many studies to test the empirical validity of the hypothesis (see Greenaway and Sapsford, 1994, Shan and Sun, 1998; Marin, 1992; Sereletis, 1992; Hodne, 1994; Henriques and Sadorsky, 1996; and Islam, 1998; Ghatak, Milner and Utkulu, 1997; Al-Yousif, 1997; Ghatak and Price 1997; Islam 1998; Sharma and Dhakal, 1994; and Ukpolo, 1994). However, there are still questions as to whether the ELG strategy will also be beneficial to the small resource-based economies of Sub-Saharan Africa. This question will be the focus of this paper. Specifically, the objective of this paper is to assess whether export revenues derived from an ‘enclave sector’ like the case of mining in Botswana, can lead to significant and positive economic growth in a country. To achieve this, the paper uses both statistical data and time series econometric analysis to test the causal relationship between exports and economic growth. This paper will provide some useful insights to policy makers in Sub-Saharan Africa, where many countries are still dependent on primary products for economic growth.

The article is arranged as follows: Section 2 discusses the contribution of exports to Botswana’s economic growth as shown by statistical evidence and econometric evidence. Section 3 is a summary of conclusions and policy recommendations.

## 2. THE CONTRIBUTION OF EXPORTS TO BOTSWANA'S ECONOMIC GROWTH

### *2.1 Evidence from statistical Data*

Botswana's ELG started during the colonial era (1885 to 1966) when the country was a British protectorate. Trade consisted of game meat, game skins and beef exports. Beef exports, which went mainly to the European Economic Community continued to be the country's main engine of growth until the early 1970s when the country discovered minerals. The latter include coal, copper/nickel and diamonds, and together with beef, constitute the country's traditional exports. These account for well over 80 percent of the country's total export earnings. Among these, the most important is diamonds, with a share of more than 70 percent in total export earnings. Therefore, in this sense, Botswana is a mineral-based economy and its ELG has generally been anchored on primary products.

Table 1 shows that Botswana's export sector has contributed significantly to the country's economic growth. First, the main export sectors of the economy, namely, beef and minerals accounted for about 44 percent of GDP in 1980. By 1997, their share had only declined marginally to about 36 percent. Secondly, these sector account for about 75 percent of total export earnings in the country. Third, and perhaps most important, the table shows that the country's revenues, of which about 60 percent comes from primary export commodities, has been able to finance both recurrent and development expenditure as well as the financial assistance policy (FAP) which was meant to initiate industrial development. In addition, the country has been able to accumulate foreign exchange reserves of well over 36 months of import cover.

This data shows that when properly managed export revenues from the primary export sector can lead to sustained economic growth. Figure 1 shows that Botswana's economic growth has been positively correlated with export growth. While export growth fluctuated significantly between positive and negative growth rates, economic growth was generally positive over the entire sample period. This result again indicates good economic management in Botswana because in years of economic boom when export



Table 1. The Contribution of Minerals to Botswana's Economic Growth and Development (Prices 1990 = 100)

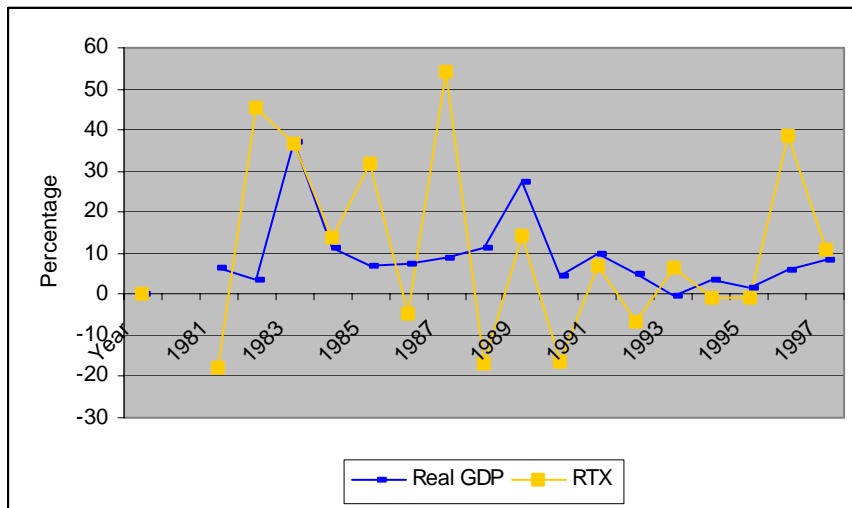
Year	Real GDP (P, million)	% of Real GDP				Expt Earn. (P'million)	% of Export Earnings			Govt Rev. (P, million)	% of Govt Revenue			Rec. Exp.	Dev. Exp. (P'millions)	FAP	Foreign Exchange Reserves (millions)		Import Cover Import Cover Months
		Agric	Gen. Govt	Manufac.	Mining		Beef	Diamonds	Manufac		Minerals	C-Pool	Grants				Pula	US\$	
1979/80	1380.00	11.7	14.2	4.1	29.7	1040.32	7.20	60.70	11.36	609.63	32.9	33.2	12.3	383.85	293.38		225	344	6
1980/81	1511.00	10.5	13.2	6.7	35.1	654.00	18.20	40.60	17.25	571.94	23.9	32.3	12.3	490.91	349.96		223	253	4
1981/82	1623.80	9.9	13.3	7.7	38.7	873.68	17.00	52.00	17.17	598.44	25.3	29.0	12.0	695.35	477.25	4.46	311	293	5
1982/83	1884.10	7.5	12.6	6.1	48.8	1469.54	11.30	66.60	12.62	824.22	34.4	27.9	8.6	814.06	384.36	4.26	457	396	7
1983/84	2101.20	5.8	12.5	5.7	50.7	1603.50	7.30	71.90	13.00	1025.97	46.9	19.4	4.9	954.53	529.54	6.89	737	472	10
1984/85	2251.90	5.3	13.4	4.2	48.8	2,241.58	7.00	75.70	8.60	1300.06	51.3	13.2	3.6	972.11	509.30	8.62	1645	748	18
1985/86	2420.60	5.5	13.5	5.1	46.8	2,130.19	7.40	74.50	10.50	1,507.11	54.6	12.4	4.4	1017.30	681.20	13.38	2201	1198	20
1986/87	2636.10	4.7	14.9	5.6	46.5	2,909.83	3.10	84.60	7.90	1,987.37	56.7	12.8	5.8	1134.34	874.84	14.77	3152	2013	24
1987/88	3038.70	6.7	16.2	6.3	41.5	2,905.15	4.20	73.90	8.10	2,764.44	59.0	11.4	4.3	1211.01	1034.16	12.39	4368	2257	24
1988/89	3702.50	5	14.9	6.5	40.5	3,644.20	3.60	76.40	7.40	2,683.60	58.0	12.8	1.5	1261.91	877.67	14.23	5248	2803	21
1989/90	3911.30	4.9	14.6	6.5	37.1	2,224.00	3.20	78.70	9.90	2,506.50	53.6	12.8	3.1	1473.08	1090.08	21.11	6234	3331	21
1990/91	4252.40	4.7	14.6	6.4	37.3	2,431.23	3.30	78.70	10.10	2,646.76	46.4	18.7	1.7	1770.46	1043.71	28.76	7707	3719	24
1991/92	4521.90	4.5	16.1	6.4	34.9	2,223.09	2.90	78.90	10.40	2,814.29	40.1	21.5	2.2	2052.24	1089.32	24.62	8561	4031	26
1992/93	4516.00	4.4	16.7	6.3	33.3	2,303.64	3.80	78.20	12.90	2,890.78	42.5	15.3	3.5	2315.96	1288.88	26.02	10 509	4097	30
1993/94	4700.50	4.2	16.8	6	33.6	2,557.56	3.70	74.90	16.20	2,303.87	52.5	15.9	1.7	2189.20	973.73	22.05	11 961	4402	33
1994/95	4847.50	3.9	17.2	6	32.1	2,602.83	3.00	67.00	24.40	2,393.83	47.4	15.2	0.7	2295.26	1080.78	27.18	13 252	4696	30
1995/96	5184.80	3.6	17.2	6	33	3,369.13	2.50	70.30	21.70	3,060.00	49.2	12.1	1.1	2438.95	1326.75	34.64	18 322	5028	38
1996/97	5544.30	3.4	17.3	5.9	32.6	3,197.78	2.20	73.80	19.50	2,664.85	56.5	13.7	2.2	2506.74	1411.17	37.04	22 619	5 675	-

Notes: Agric = Agriculture; Gen. Govt = General Government; Manufac = Manufactures; Rev. = Revenue; Expt = Export

\*Real Government Revenue and Real Export Earnings converted from nominal to real figures using GDP deflator.

Source: CSO: Statistical Bulletins, Botswana, various years and International Financial Statistics, 1999

Figure 1: Real GDP Growth and Real Export Growth: 1980 to 1997



Note: RTX is total export growth

revenues are high, the surplus export earnings are converted into foreign reserves, thus avoiding overheating the economy. On the other hand, in years of bust, which may have led to negative growth rates, government draws down on the reserves to finance economic growth and development. As a result economic growth has generally been positive.

## 2.2 Econometric Evidence

The econometric evidence for the contribution of exports to Botswana's economic growth is based on the aggregate production function models (APFM). The APFM assumes that, along with "conventional inputs" of capital and labor used in the Neoclassical production function, "unconventional inputs" like exports and other variables may be added into the model to capture their contribution to economic growth. The model is used by, among others, Feder, 1983; Fossu (1990) and Ukpolo (1994). Following the APFM, the general models to be estimated for Botswana are defined as follows:

$$y_t = \alpha_0 + \alpha_1 D_v + \alpha_2 k_t + \alpha_3 l_{f,t} + \alpha_4 x_t + \alpha_5 m_t + \alpha_6 g_t + \alpha_7 p_t + \alpha_8 y_{t-1} + \alpha_9 y_{w,t} + \varepsilon_t \quad (1)$$

$$y_t = \beta_0 + \beta_1 D_v + \beta_2 k_t + \beta_3 l_{f,t} + \beta_4 x_{p,t} + \beta_5 x_{n,t} + \beta_6 m_t + \beta_7 g_t + \beta_8 p_t + \beta_9 y_{t-1} + \beta_{10} y_{w,t} + \varepsilon_t \quad (2)$$

Where  $y_t$  is real GDP,  $k_t$  and  $l_t$  are the normal neoclassical conventional inputs of capital  $k_t$ , which is proxied by the ratio of gross domestic investment to GDP and labor force ( $l_{f,t}$ ). The other variables are the “unconventional inputs” and include aggregate exports ( $x_t$ ), primary exports ( $x_{p,t}$ ), manufactured (nontraditional) exports ( $x_{n,t}$ ); imports ( $m_t$ ), private sector ( $p_t$ ), which is proxied by private sector consumption in real GDP; government sector ( $g_t$ ); previous period growth in real GDP ( $y_{t-1}$ ) and finally, world GDP ( $y_{w,t}$ ). All these variables are assumed to play an important role in the economic growth of developing countries. The lower case letters denote annual percentage growth rates over the sample period 1975 to 1997.  $D_v$  is a dummy variable which takes  $D_v = 0$ ; 1975 to 1979 and  $D_v = 1$  thereafter. This is meant to capture the effect of the economic boom that came with the opening of the Jwaneng diamond mine and the construction of the Jwaneng town.

### 2.3 Discussion of the Results

These models were estimated by OLS for the period 1976 to 1997. First, we estimated model I which includes all the variables (see Table 2). The results show that the variables have correct signs as predicted by theory. For instance  $k_t$ ,  $x_t$ ,  $m_t$ ,  $g_t$  and  $p_t$  carry a positive sign even though they are insignificant. The labor force variable is negatively signed and significant at the 5 percent level. This is indicative of the growing unemployment problem in the country because the Botswana economy is based on land intensive agriculture and capital intensive mining, both of which have limited employment benefits for the country. Equally important is the world economic growth variable, which carries the correct positive sign and is significant at the 5 percent level. This suggests that Botswana’s economic growth is positively linked to and influenced by world economic growth. This is in line with theoretical expectation since the country’s

major exports of beef and diamonds have over the past three decades or so been positively correlated to world demand, which itself is a function of world economic growth.

The intercept dummy in this model, and in the models that follow is significant at the 5 percent level, and takes positive values. This suggests that the country's second largest diamond mine that was opened at Jwaneng around 1980 and the construction of the mine town as well as the infrastructure these developments attracted had a positive impact on the country's economic growth.

Diagnostic statistical tests of this model appear to be reasonably good. The Durbin-Watson statistic of 1.854 is reasonably near to 2 and along with the LM statistic ( $S_{11}=0.28434$ ) which is far less than  $\chi^2(1) = 3.841$ , suggest that there is probably no problem of serial correlation. Likewise, one would fail to reject the null hypothesis of correct functional form since  $F_{[0.05, 1, 10]} = 1.3920$  is less than the critical value of 4.96. There also seems to be no problem of normality of residuals and heteroscedasticity.

The main limitation of this model is that most of the variables are insignificant. Therefore, to improve the explanatory power of the model and achieve a certain degree of parsimony we imposed restrictions:  $\alpha_5 = \alpha_7 = 0$ ; and estimated Model II. There is a reasonable improvement on this model compared with the unrestricted one. All the variables are significant and carry the expected signs except capital growth and export growth. Second, the explanatory power of the model has reasonably improved since R-bar squared rose from 0.2616 to 0.3112. Diagnostic tests indicate no problem of misspecification. Most important, the F-test suggests validity of the restrictions at the 5 percent level.

Table 2: Regression Results: Real GDP growth vs real exports growth and other growth variables 1975 to 1997

Equation	Constant	Dummy	K <sub>t</sub>	L <sub>t</sub>	X <sub>t</sub>	X <sub>pt</sub>	X <sub>nt</sub>	G <sub>t</sub>	M <sub>t</sub>	P <sub>t</sub>	Y <sub>t-1</sub>	Y <sub>wt</sub>	n	R <sub>2</sub>	dw	S <sub>11</sub>	S <sub>22</sub>	S <sub>33</sub>	S <sub>44</sub>
<b>I</b>	1.2207	9.1819	0.1660	-4.0720	0.0230			0.1290	0.0730	1.9360	-0.3760	2.4070	22	0.2616	1.8540	0.2843	1.3920	2.3369	1.5131
<b>t-ratos</b>	-0.1100	-1.856**	1.0580	-2.488**	0.4510			1.1930	1.0500	0.4540	-1.812**	1.967**							
<b>II</b>	0.6125	7.8799	0.1900	-3.6990	0.0160			0.1440			-0.2890	2.2650	22	0.3112	1.6840	1.5105	0.2580	3.0278	1.7198
<b>t-ratos</b>	0.0570	1.769***	1.2770	-2.514**	0.3280			1.410***			-1.568***	1.975**							
<b>III</b>	3.9119	8.6351	0.1740	-3.9590		0.0590	-0.0810	0.1160	0.1110	1.6650	-0.6020	2.3520	22	0.4694	1.9050	0.0533	0.3208	1.2472	0.0245
<b>t-ratos</b>	0.4160	2.079**	1.2950	-2.869**		2.086**	-1.872**	1.2680	1.804**	0.4456	-2.663**	2.190**							
<b>IV</b>	3.6702	8.0949	0.1820	-3.7550		0.0600	-0.0790	0.1230	0.1030		-0.5790	2.2100	22	0.5076	1.8247	0.2334	0.0356	1.2453	0.0112
<b>t-ratos</b>	0.4060	2.111**	1.420***	-2.986*		2.218**	-1.902**	1.426***	1.813**		-2.728*	2.232**							

where S<sub>11</sub> is LM statistic for first order Serial correlation with  $\chi^2(1)$

S<sub>22</sub> is an F- RESET test statistic for functional form.

S<sub>33</sub> is the Jaque-Bera test for normality of residuals given as  $\chi^2(2)$

SS<sub>44</sub> is LM test for heteroscedasticity also given as  $\chi^2(1)$

\*Significant at 1% level, \*\*Significant at 5 % level, \*\*\*Significant at 10 % level

# t-values in brackets, for one tail test.

One possibility may be to further impose zero restrictions on the insignificant variables,  $k_t$  and  $x_t$ . However, this is not advisable on theoretical grounds. For instance, it would not make sense to imagine an economy that grows without any use of capital in this era of technological innovation and economic globalisation. In like manner, exports cannot be taken out of the equation since they are the main focus of our study. This means that for the model based on aggregate exports, the most reasonably good and parsimonious model is Model II.

There is a possibility that the insignificance of the export coefficient in models I and II may be due to the fact that the two categories of exports,  $x_{p,t}$  and  $x_{n,t}$  carry opposite signs, which when aggregated together, cancel each other's influence, leading to the insignificance of  $x_t$  (see Ghatak, Price and Utkulu, 1997). To account for this possibility we estimated models III and IV.

Model III looks a lot more favourable when compared to Model II. The coefficients of  $l_{f,t}$ ,  $x_{p,t}$ ,  $x_{n,t}$ ,  $y_{w,t}$  and  $Dv$  are all significant at the 5 percent level. Only  $m_t$  is significant at the 10 percent level. Therefore, this model gives more significant variables than model II. Secondly, R-bar squared has improved from 0.2616 in Model II to 0.4694 in Model III. The Durbin-Watson statistics are 1.854 and 1.9050 respectively. Other diagnostic tests also indicate no mis-specification problems.

However, one may still achieve some degree of parsimony and improvement in the explanatory power of the model by imposing the restriction  $\beta_8 = 0$ , since the private sector variable carries the most insignificant coefficient in Model III. We do this, and thus estimate Model IV. The results show a great improvement when compared with those of the previous model. All the explanatory variables are significant at the 5 percent and 1 percent levels. The explanatory power of the model is highly improved since R-bar squared is now 0.5076 compared to 0.4694 in the previous model. All the other diagnostic tests also appear to be in order. Looking at the calculated F-statistic we fail to reject the null hypothesis that the private sector should be excluded from the model. This means that Model IV is the most reasonable approximation of the appropriate model

for the economy of Botswana. It is again the most parsimonious among the models based on disaggregated exports.

## 2.5 *Policy Implications*

The results of the previous section are important in showing the impact of both primary exports and manufactured exports on Botswana's economic growth. Looking at model II, and specifically at exports which are the main focus of the study, we note that a 1 percent increase in traditional exports ( $x_{p,t}$ ) would lead to an annual economic growth rate of 0.06 percent in Botswana, *ceteris paribus*. Likewise, for non-traditional exports ( $x_{n,t}$ ), there would be a reduction in annual economic growth rate of 0.079 percent. The positive and significant coefficient of  $x_{p,t}$  confirms the results from the statistical data that primary exports are a major engine of growth in Botswana. On the other hand, the negative but significant coefficient for the  $x_{n,t}$  indicates that the growth in Botswana's manufactures is mainly achieved by drawing resources from the rest of the economy, which as we have seen previously, is done through the provision of economic incentives. Furthermore, this implies that a critical level of economic development is required for manufactured exports to have a positive and significant impact on Botswana's economic growth. These results are similar to those of Ghatak, Price and Utkulu, (1997) who also found that for developing countries which have not yet achieved a critical level of economic development, primary exports and manufactured exports carry opposite signs. The study of export composition and economic growth in eight developing low-income African countries also comes to the same conclusion on the role played by primary exports on economic growth (Ukpolo, 1994). The study however, cautions policy makers not to rely on this sector for long term growth because of the potential problem of deterioration in the terms of trade for primary products.

The insignificance of the private sector variable ( $p_t$ ) in these models suggests that, even though government policy is to develop the economy through private sector initiative, the contribution of the latter is still too weak to make a significant contribution to the country's economic growth. This finding is in line with the negative sign of non-traditional exports which suggests that these grow by drawing resources from the rest of

the economy. This would suggest that government, whose contribution to economic growth is still positive and significant, resulting in an annual contribution of about 0.123 percent to economic growth, would do well to continue to drive the country's economic development. The withdrawal of government in favour of the private sector could take place only in areas where the latter has gained efficiency, and appears likely to succeed.

The results also suggest that Botswana's unemployment problem is quite serious. Model IV indicates that a 1 percent annual growth in the labor force would result in a 3.76 percent fall in annual real GDP growth, *ceteris paribus*. This contrasts sharply with capital ( $k_t$ ), where the contribution to economic growth is positive at 0.18 percent. Equally important is the variable for world growth which indicates that a 1 percent growth in this variable would result in an annual real GDP growth of 2.21 percent.

### 3. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The main objective of this paper was to assess whether export revenues derived from a primary export sector like the case of mining in Botswana can lead to a positive and significant economic growth in a country. The study was based on evidence from statistical data and econometric analysis of the economy of Botswana. The results indicate that Botswana has been able to manage its primary export revenues in such a way that the country is able to cover both recurrent and development expenditure as well as financing government effort to initiate industrial development for economic diversification through the financial assistance policy (FAP). In addition the country has been able to accumulate foreign reserves of well over 36 months of import cover. These statistical results indicate the importance of good governance and financial management in achieving sustainable economic growth in a primary exporting country.

The results of the APFM corroborate the results of statistical analysis. These suggest that  $k_t$ ,  $l_{f,t}$ ,  $x_{p,t}$ ,  $x_{n,t}$ ,  $m_t$ ,  $g_t$ ,  $y_{t-1}$  and  $y_{w,t}$  are important determinants of Botswana's economic growth. The positive impact of traditional exports and the negative impact of non-traditional exports on Botswana's economic growth suggest that the country is still so

dependent on primary exports that the growth in manufacturing can only be achieved by withdrawing resources from the rest of the economy. Along with this, the insignificance of the private sector variable ( $p_t$ ) in a country where government efforts have been directed at developing the country through private sector initiative will be a cause for concern to policy makers. Likewise, the negative impact of labor force growth on economic growth indicates the need to address the growing problem of unemployment in the country.

These results are important in that they show that, when properly managed, primary export revenues can lead to positive and significant economic growth as in a country. *However, though important, this result should be seen as a short term transition strategy as the economy moves towards sustainable long term economic growth based on manufactures and services as the main engines of growth.*

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