Openness, Primary Goods Exports, and Growth
with a Reference to the Case of Algeria over the Period 1970-00

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Résumé :

L'objectif de ce travail est d'analyser l'impact de l'instabilité macroéconomique sur la croissance économique. Cette analyse est faite par le biais d'un modèle de Solow augmenté de deux indicateurs d'instabilité macroéconomiques, la volatilité des termes d'échange et la prime du marché noir. Les résultats de l'estimation de ce modèle sur la période 1970-00 montrent que ces indicateurs sont négativement liés à la croissance. Leur contribution à la croissance du PIB par tête de l'Algérie durant la période considérée est négative.

Le reste de ce travail est organisé comme suit. Le lien entre l'instabilité macroéconomique et la croissance économique est brièvement discuté dans l'introduction. Le positionnement de l'Algérie, en termes de croissance et d'instabilité macroéconomique, par rapport à un certain nombre de pays et de groupes de pays, est décrit à la section 2. Le modèle économétrique utilisé ici est introduit à la section 3, alors que les résultats obtenus de l'estimation sont analysés à la section 4. Les implications pour l'Algérie constituent la section 5. La dernière section est consacrée aux conclusions.

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Abstract

The objective of this work is to investigate the effect of openness, and primary goods exports on economic growth. For this purpose, we use data on a sample of countries over the period 1970-00, and estimate a Barro type regression model, based on the neoclassical theory, in which a measure of openness and an indicator of primary goods exports are included. The results obtained show that openness is positively linked with growth, indicating that the more opened a country is the faster it grows. On the other hand, primary goods exports appear to be negatively related to growth, meaning that the more a country relies on primary goods exports the slower its growth rate will be. The model predicts a comparatively slow growth pattern for Algeria as a result of its comparatively bad record in terms both openness and primary goods exports. JEL Codes: C21, F43, O57.

Keywords: Openness, Primary goods exports, Economic Growth, Cross-country studies.

1. Introduction:

There is a heated debate regarding the question of whether openness to international trade is beneficial for economic growth. Theoretical work on this issue is usually based on the concept of comparative advantage and credits economic liberalization with at least a transitory positive effect on growth. Empirical investigations of the link between openness and growth, however, suffer from various deficiencies. Rodriguez and Rodrick (2001), present (i) the questionable use of econometric methodologies, and (ii) the inappropriately measured indicators on openness as the two major shortcomings plaguing empirical work on openness and growth.

Cross-country studies carried out in the spirit of Barro (1991) are fraught with problems, in particular those related to endogeniety, and their treatment. Case studies, on the other hand,

lack statistical rigour and are often exposed to arbitrary case selection. Lack of time series long enough on some explanatory variables in some cases, and absence of regular periodical data on other variables, especially in developing countries, are two major difficulties plaguing the time series approach.

Despite the shortcomings of the first approach, it has been extensively used to investigate the issue of growth determinants. Following this approach, we use a set of countries and data over the period 1970-00 to investigate the relationship between growth on one hand, and openness and primary goods exports on the other. The results we obtained show that per capita GDP growth is positively linked to openness, indicating that the more open a country is, the faster it grows. Reliance on primary goods is, in contrast, not growth enhancing.

The conclusions we draw from the estimated regression equations regarding Algeria's growth record are : (i) being closed to international trade in the sense of Sacks and Warner (1995a) has caused Algeria a significant loss in terms of per capita GDP growth that otherwise could have been avoided if Algeria had been open. (ii) Reliance on hydrocarbon exports in the development strategy also reduced Algeria's per capita GDP growth.

The rest of this work is organized in the following way. Related empirical literature is presented in section 2. A descriptive analysis is conducted in section 3 in the aim to benchmark Algeria's position, in terms of growth, and openness and primary goods exports, against that of other countries and groups. In section 4, we present the econometric model being used to conduct the econometric analysis. The results are analyzed in section 5, whereas the implications for Algeria are exposed in section 6. Section 7 concludes.

2. Related Empirical Literature:

Early developments in economic theory suggest the existence of a close tie between international trade and productivity. Many years ago, authors such as Romer (1990), Grossman and Helpman (1990), and Pritchet (1991) stressed the role of openness to international markets in enhancing growth. Empirically, the focus has typically been on the relationship between exports and growth and to a lesser extent on the link between imports and growth and between total trade and growth.

Sachs and Warner (1995a) follow another route to deal with the growth-openness nexus. They set five criteria which are thought to cover the major types of trade restriction to classify countries into two groups : open countries and closed countries[1]. A country is judged as one with a closed trade policy if it has at least one of the following characteristics. (i) Nontariff barriers covering 40 percent or more of trade ; (ii) average tariff rates of 40 percent or more ; (iii) a black market exchange rate that is depreciated by 20 percent or more relative to the official exchange rate, on average, during the 1970's or 1980's ; (iv) a socialist economy system ; and (v) a state monopoly on major Exports. An open economy is defined as one in which none of the five conditions applies.

The major findings of Sachs and Warner (1995a) are that open economies, according to their criteria, outperformed closed economies over the period 1970-89 on three main dimensions of economic performance: economic growth, avoidance of extreme macroeconomic crises, and structural change. Furthermore, a close link between economic integration and economic convergence is established in the paper. Poor countries tend to grow faster than

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[1] See Sachs and Warner (1995a), p. 22.

rich countries when they are linked to international trade, and integrated in the world economy. In contrast, rich and open economies are found to perform much better than poor and closed economies in the sample they used and over the period of their study.

The same evidence on openness is presented by Sala-i-Martin (1996, 1997) who finds openness to be strongly correlated with growth. Sachs and Warner (1997a, 1997b), and more recently Bosworth and Collins (2003) also find the Sachs-Warner openness measure to be positively associated with growth. These empirical findings, accord well with economic theory which suggests that open economies might converge faster than closed economies, given that international mobility of capital and technology can speed up the transition to steady-state income.

In a more recent survey of empirical and theoretical literature, Anderson and Babula (2008) conclude that nearly all the empirical analyses confirm the link between openness and economic growth. Furthermore, Rizavi et all (2010) apply a panel model to a panel data set to investigate the relationship between trade and economic growth in India, Bangladesh, and Pakistan. They find that openness played an important role in shaping the economic growth of South Asia during the period 1980-2008.

Bülent U. (2012) carries out an empirical investigation to assess the openness-growth nexus over the period 1960-2000. He concludes that many of the variables he uses as measures of openness are positively and significantly correlated with long-run economic growth. He argues, however, that this result is sometimes due to the presence of a few outlying countries. He also notes that the openness variables become insignificant when controlling for

variables such as institutions, population heterogeneity, geography, and macroeconomic stability

The need to use detailed country-level case studies instead of cross-country regressions to better understand the link between openness and growth has also been highlighted. Chandra Pradhan N. (2011) follows this way and uses a time series approach to analyze the effect of openness on the Indian economy during the period 1970-09, focusing more on the liberalization period that began in the 1980's. The empirical testing of an export-led growth hypothesis he performed, based on various time series techniques, revealed both short and long-run relationship between export and growth.

The conclusion that openness is positively linked to growth has, however, been challenged in a famous article by Rodriguez and Rodrik (2001). The authors argue that empirical studies, such as the early ones referred to previously, suffered from a number of methodological shortcomings, which resulted in the relationship between openness and growth being insignificant. They further provide evidence on the fact that derived results in many studies were ascribed to openness indicators being inappropriately measured, whereas more appropriate indicators failed to deliver such results.

Regarding the inappropriate measurement of openness, Rodriguez and Rodrik (2001) attribute the explanatory power of the Sacks and Warner openness measure, found to be robust in many studies, almost exclusively to the use of the State monopoly of exports and the black market premium variable in the openness index. A closer look at these two variables, however, revealed that they were not proxying trade policy, but rather were bringing in

measurement errors that tended to bias the coefficients in favour of finding a growth-openness link.

Later, Baldwin (2003) proceeds in the same direction when examining the controversy that still surrounds the nature of the relationship between growth and openness. He argues that (i) definitional issues regarding openness, (ii) differences in the quality and details of the data being analyzed, and (iii) differences in the econometric models and tests employed, are the main sources for the disagreement among economists on this subject.

Rodriguez (2006) pushes the argument a little bit farther when he states that a close reading of the evidence presented in some papers does not alter the main conclusion in Rodriguez and Rodrik (2001) that standard measures of trade are uncorrelated with growth. According to this argument, a possible interpretation of the results obtained in favour of a link between openness and growth is simply indicative of the pitfalls of the use of cross-country regression analysis.

Reliance on primary goods exports is, on the other hand, seen to hamper growth. Empirical evidence on this can also be found in Sachs and Warner (1995b) who find a negative relationship between growth and the ratio of natural resource exports to GDP. According to this finding, economies with a high initial ratio of natural resource exports to GDP tend to have low subsequent growth rates. This negative relationship holds true even after controlling for other variables found to be important for growth, such as initial per capita income, trade policy, government efficiency, investment rates, and other variables. The findings of Sachs and Warner were later borne out by the evidence in Sala-i-Martin (1996, 1997) who established a negative link between the fraction of primary products in total exports and growth.

One of the explanations for this negative relationship can be found in the area of political economy. Lane and Tornell (1995) argue in a formal model that resource-rich economies are more exposed to extreme rent-seeking behaviour than resource-poor economies, as national politics is oriented to grabbing the rents earned by the natural resource endowments. Another explanation draws more upon the ideas found in the development literature, and in the Dutch Disease models. The argument here is that resource-based growth would be ineffective because the world prices of primary exports relative to manufactures show a deep tendency towards secular decline.

A final economic argument against natural resource-based growth is that "beneficial forward and backward linkages" from primary exports to the rest of the economy would be small. This view originated in the work of Hirshman (1958), Seers (1964), and Baldwin (1966). The fundamental idea here is that manufacturing, as opposed to natural resource-production, is what leads to a higher standard of living through a more complex division of labour.

Along the same lines, Matsuyama (1992) examines the role of agriculture in economic development in a model in which manufacturing is characterized by learning-by-doing. He concludes that forces which push the economy away from manufacturing and towards agriculture lower the growth rate of the economy, by reducing the learning-by-doing induced growth of manufacturing. In this context, trade liberalization in a land-intensive economy could slow economic growth by causing the economy to shift resources, such as capital and labour, from manufacturing and towards agriculture.

Matsuyama's framework is useful for studying labour-intensive production of natural resources, such as in agriculture,

because the agricultural sector directly uses the factors of production that otherwise would be in manufacturing. It is, however, of a little help for a natural resource sector like oil production, which is the case of Algeria and many other oil-exporters in our sample, because the oil sector uses very little labour, and therefore does not draw labour from manufacturing. Fortunately, it can be extended using the framework of the Dutch disease model. We will not, however, follow this idea through because of a lack of space, and it is not our major concern here. Instead we turn to the analysis of Algeria's position in terms growth, openness, and reliance on primary goods exports.

3. Benchmarking the Position of Algeria in terms of Growth, Openness, and Primary goods Exports

Three indicators are exposed in Table 1. The first is average per capita GDP over the period 1970-00, the second is the proportion of years over the period 1970-92 in which a country is classified as open, and the third is the share of primary goods in GDP in 1970. For the groups included in the table these indicators are calculated as simple averages with the number of countries used in the calculation indicated by nb. The analysis of these indicators is conducted below.

3.1. Openness

The openness indicator (OP7092) is borrowed from Sachs and Warner (1995a), mentioned earlier. According to the criteria set there, if a country is open in a particular year it gets a value of 1 ; otherwise it gets 0. An average over the period 1970-92 is then calculated. The figure for Algeria is simply zero, and indicates that Algeria is classified as a country that was never open over the period

1970-92 despite the fact that some trade liberalization took place by 1991. This figure is associated with a per capita GDP growth of 1.19 percent over the period 1970-00.

Algeria is known to have adopted a socialist growth model that was inward oriented, largely dependent on oil exports in financing the heavy industrialization strategy, and reduced dependency on external investment and imports. This strategy lasted for about a quarter century before the country started to initiate a series of reforms by the end of the 1980's and the beginning of the 1990's as a result of the drawbacks of the centrally planned system that manifested by the second half of the 1980's when oil prices fell sharply.

Along with Algeria, Nigeria too is given an average value of zero for the period 1970-92, meaning that this country was never open during that period. Its per capita GDP during the period 1970-00 is simply negative. In fact, the oil exporters group detains the lowest per capita GDP as well as the lowest openness indicator compared to the other groups. In most of these countries, the State had the monopoly of oil exports, which constituted the major part of exports, imposed high tariffs on imports, and the black market premium was well above the limit set by the Sachs-Warner criterion. Among the oil exporting countries included in our sample, only Venezuela was classified as open during some of the years covered here, but that was not enough to avoid the negative growth rate recorded over the period 1970-00.

The sample average of the openness indicator is about 0.37, well above the other groups' averages. Many countries in our sample, such as Korea, are classified as open over the entire period, and get the value of 1 as a result. The MENA region, with an average

level of 0.14, is less open compared to other regions[2] such as East Asia and the Pacific (0.70) or Latin America and the Caribbean (0.24). Among the nine countries belonging to the MENA region and included in our sample, Tunisia has an average years of openness over the period 1970-92 that is higher than the average for the region as a whole. In particular, Tunisia outperforms Algeria, in terms of openness and per capita GDP.

Before closing this subsection on openness, it is important to remember that the data set on this indicator extends only to 1992. Since we are calculating an average of years during which a country is ranked as open over the period 1970-92, the conclusions one might draw on openness over the extended period, 1970-00, are not exactly true. The criteria for openness over the missing years might indicate changes in a country status regarding international trade. In this case, values for individual countries, averages for groups, and coefficient estimates in regressions in which openness is included as an explanatory variable might be different from the ones we have actually obtained. Nevertheless, recent studies such as that of Bosworth and Collins (2003) still use the Sachs-Warner openness indicator when dealing with a time period that extends to the year 2000.

In the case of Algeria, the country continued to be closed to international trade till the end of the period despite the reductions in the maximum tariff duty from 60% to 45% that took place 1996 and 1997. These reductions were simply not sufficient to shift Algeria from a closed to an open economy to international trade according to the Sachs-Warner criteria. The black market premium over the period 1993-00, which is not covered by the openness

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[2] The figures for these regions are not included in Table1, but they can be calculated in the same way using data described in the appendix.

data, remained well above the level set by these criteria. The conclusions drawn over the entire period with respect to Algeria remain therefore more or less valid.

3.2. Natural Resource Exports

The other indicator included in Table 1 is the share of natural resource exports in GDP in 1970 (SXP70). Such an indicator was used by Sachs and Warner (1995b) who managed to establish a negative relationship between growth and the ratio of natural resource exports to GDP. According to this finding, economies with a high initial ratio of natural resource exports to GDP tend to have low subsequent growth rates. This negative relationship holds true even after controlling for other variables found to be important for growth, such as initial per capita income, trade policy, government efficiency, investment rates, and other variables. The findings of Sachs and Warner were later borne out by the evidence in Sala-i-Martin (1996, 1997) who established a negative link between the fraction of primary products in total exports and growth.

The last column in Table 1 shows that oil exporters with 0.32 had the highest share of natural resource exports in GDP in 1970, and the lowest per capita GDP. In this group, two countries, Oman and Saudi Arabia, which do not appear in Table 1, had very high shares of natural resource exports in GDP[3] in 1970. Oman with 0.89 detains the highest share, while Saudi Arabia follows with 0.60. Algeria's share was below the averages for the MENA region and oil exporters, but it was higher than those for Tunisia and Egypt, and even than that for Nigeria. The lowest share is again the one

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[3] Per capita GDP growth is missing for both countries. We have, however, calculated the average per capita GDP growth for both countries over the period 1970-02 using the World Bank Indicators. For Oman, the average is about 2.4%, while that for Saudi Arabia is 0.6%.

recorded by Korea which has the highest growth shown in the Table 1.

Can we infer a sort of relationship between these two indicators and growth from table 1 ? The answer is not an easy one. To see why, we look at some entries in the table. It is clear that Korea detains the highest growth rate, the maximum value for openness, and the lowest value for the share of primary exports in GDP as compared to all countries and groups in the table. For the oil-exporters group the figures are the other way around: the lowest PCGR, the highest SXP70, and the lowest OP7092 among all considered groups here. However, Algeria has a positive PCGR and a zero value for OP7072, while for Venezuela PCGR is negative and OP7092 is positive. So, this is not sufficient to establish any sort of link between these three indicators. We leave this task to the next two sections

4. The Econometric Model

In order to analyze the relationship between growth, and openness and reliance on primary goods exports we use a model that has the following generic representation, due to Durlauf et al (2004), as our growth regression

$$\gamma_i = \lambda \log y_i(0) + \psi X_i + \Pi Z_i + \varepsilon_i,$$

where γ_i is per capita GDP growth, $y_i(0)$ is initial per capita income, X_i contains a constant, an indicator of physical capital, another for human capital, and effective capital depreciation. The variables contained in $\log y_i(0)$ and X_i represent those growth determinants that are suggested by the Solow growth model, whereas Z_i represents those growth determinants that lie outside Solow's original theory.

In general, the specification given above has been the baseline for much of what is known as growth econometrics. This type of regression is sometime named after Barro (1991) because of the extensive us he made of these regressions to study alternative growth determinants. Many other growth writers have also used it for the same purpose.

Assuming away possible endogeneity of regressors, the specification introduced in this section is estimated by ordinary least squares (OLS) over the period 1970-00. The set of countries used comprises 107 countries in total[4], among which 81 are classified as developing countries, 9 belong to the MENA region, and 8 are oil exporting as per the World Bank classification of 2004. In addition, 31 countries are classified as non open according to criteria set in Sachs and Warner (1995), among which Algeria is one.

When heteroscedasticity is present, we simply use the White Hetroscedasticity Covariance Matrix Estimator (White) without any further investigation of its form. The decision whether to use the White estimator or not is based on the White statistic ($= nr^2$). The other statistic (W), which is also calculated here, is used to perform an asymptotic Wald test for parameter stability. The purpose of this test is to see whether the estimated model can be used to draw conclusions about Algeria. The remaining statistics included here are the usual t, F, and $\overline{R}^2$.

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[4] The sample of countries used in each model is less than 107 depending on data availability. The whole set of countries used in this study is presented in the appendix.

5. Regression Results for Growth Rates

The regression results obtained are presented in Table 2. They are first analyzed with respect openness which is measured by the indicator OP7092, then in terms of primary goods exports as indicated by SXP70.

5.1 Openness: OP7092

This variable is measured by the fraction of the number of years over which a country is classified as open to the total number of years over the period 1970-92. As we argued earlier, we expect this variable to be positively related to growth. The more open to international trade a country is the faster it grows. This prediction is confirmed in all the equations in which OP7092 is included by the significant and positive estimated coefficient on this variable.

The variable OP7092 is not only highly significant and positive, but it adds much to the explanation of per capita GDP growth when included along with the Solow variables. This can be seen from the rise in the coefficient $\overline{R}^2$ in Eq. 1, as compared to the MRW model[5]. The rise is significant and reaches about 11 percentage points. The coefficient on OP7092 in Eq.1 implies that a country that is open to international trade during the entire period 1970-92, that is a country for which OP7092 is equal to 1, is estimated to grow faster than a country that is closed to international trade over the same period, and for which OP7092 is zero, by about 2.1 percentage points on annual average.

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[5] The MRW model is the Mankiw, Romer, and Weil model (1992) which includes all the original Solow variables and an index for human capital. The results for this model are not presented here because of a lack of space. They can be found in Raad (2006).

The effect of openness on per capita GDP growth does not change much in our case. The estimated value of the coefficient on openness stands at 0.019 when we control for the share of primary goods in GDP in addition to the Solow variables, Eq. 5, as compared to 0.022 in Eq. 1. The corresponding predicted rise in per capita GDP growth is 0.76 percentage points, in the former case, as compared to 0.84 in the latter, as a result of a one-standard deviation rise in openness which is equivalent to 0.4 in our sample. This efect of openness on per capita GDP growth is, however, much lower when we control for more explanatory variables, such as the rule of law, the terms of trade volatility, and the share of primary goods exports in GDP, at the same time[6].

Similar results have been found by Sachs and Warner (1995a) who estimate the net effect from a point increase in openness on annual growth to be around 2.45 percentage points in one of their regression equations. In that regression, they control for a set of growth determinants that includes, among others, primary and secondary school enrollment, the investment ratio, and three measures of political instability. The same authors, Sachs and Warner (1995b), find this effect to be around 1.94 percentage points when they partial out the effect of the terms of trade volatility, bureaucracy, and the share of primary exports in GDP, in addition to the investment ratio, and initial per capita income.

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[6] The results obtained in a model in which we control for the rule of law, the terms of trade volatility, and the share of primary goods exports in GDP, along with the Solow Variables, without the population growth, show a much lower effect of openness on predicted per capita GDP growth. See Raad (2006) for more details. The same evidence is also present in Bulent (2012).

5.2 The Share of Primary Exports in GDP: SXP70

This variable is included to detect the effect on growth of the extent to which an economy is dependent on the exports of primary goods such as agricultural products, or hydrocarbons as is the case for Algeria. As we argued in section 2, abundance of natural resources depresses growth mainly because of the rent-seeking behaviour that characterizes economies that are heavily dependent on natural resources. The variable SXP70 which measures the share of primary exports in real GDP in 1970, is therefore expected to affect growth negatively.

The regression results in Tables 2 demonstrate that this variable is very strongly and negatively associated with per capita GDP growth whatever variables we control for. The value of the estimated coefficient on the share of primary goods exports in GDP lies between -0.053, Eq. 3, and -0.060, Eq. 4. The implications of these values are that a one-standard-deviation increase in the variable SXP70, which is equivalent to 12 percentage points in our sample, is estimated to reduce subsequent annual per capita GDP growth by 0.63 percentage points in the first case, Eq. 3, and by 0.72 percentage points in the second, Eq. 4. Sachs and Warner (1995a) estimate this effect to be around 0.95 percent per annum in a regression in which they hold constant, in addition to investment and initial per capita income, a measure of bureaucracy, openness, and the terms of trade volatility.

To end this subsection, we should draw attention to an important result that is reflected in our estimated equations. It is related to the fact that the adverse effect of resource abundance does not operate through lower investment rates, since the negative partial association between SXP70 and subsequent annual per capita GDP growth is maintained, despite the fact that we

always control for the rate of investment (LINV7000) in the regressions in which SXP70 is included. This result may suggest that the adverse effect of resource abundance works principally through another channel which is total factor productivity. The same result is brought forward by Sachs and Warner (1995a).

6. The Implications for Algeria

The implications for Algeria are shown in Table 3 where predicted per capita GDP growth for Algeria is calculated and its sources are traced for the six equations estimated here. The final result is the contribution of each variable used in the particular equation to Algeria's fitted per capita GDP growth. This contribution is made of the product of the following two parts: (i) the value of the corresponding estimated coefficient, and (ii) the deviation of Algeria's value relative to the mean value of the variable being considered. Therefore both the estimated coefficient and the relative record for Algeria are important when calculating the contribution of a factor to Algeria's fitted growth.

The limited openness to international trade adversely affected Algeria's growth over the period 1970-00, as shown by all estimated equations in which openness is included. Its impact is more evident when other growth determinants are excluded from the regression equation. The calculations undertaken in Eq. 2, for example, where population growth (GPOP) and the share of primary goods exports in GDP are excluded, show that being closed to international trade cost Algeria about -0.83 percentage points in terms of per capita GDP growth. This impact is lower (= -0.70 percentage points) in Eq. 5 which controls for GPOP and SXP70.

As regards the share of primary exports in GDP, our results show that this factor had a lower negative effect on Algeria's per

capita GDP growth over the period 1990-00 as compared to openness. Part of the explanation of this result lies in the fact that the share of primary goods in GDP is used as an initial value. In fact, Algeria's deviation relative to the sample mean in terms of this indicator was relatively small in 1970. However, Algeria's dependence on oil exports deepened later on, and this ratio increased much. On the other hand, the magnitude of the effect of this factor does not appear to depend much on the other variables being controlled for in the regression equation. Overall, the impact of primary exports on Algeria's fitted growth is -0.29 percentage points in Eq.3, and remains fixed, at -0.31 percentage points, in the other equations where it appears.

The conclusion that we can draw from these results regarding Algeria is that all trade restrictions that were imposed as part of the development strategy pursued by Algeria, in particular over the first two decades of our period of study, were harmful to its growth record. Hence, all measures such as high tariff duty rates, exports and imports prohibitions, authorisations for payments, restriction on the access to foreign exchange were not on average beneficial for per capita GDP growth. More, the development strategy itself is at issue here since all was based on the exports of a primary good.

7. Conclusions

In this work, we analyzed the link between growth, and openness and primary goods exports. The results we obtained reveal a positive relationship between per capita GDP growth and openness as measured by the number of years a country is classified as open as defined earlier on. These findings are in accordance with the predictions of a large empirical work for which the more open a country is the faster it grows, and vice versa.

On the other hand, the share of primary goods exports in GDP is found to be negatively associated with growth. Again, our results accord well with empirical findings. The argument for this negative association is that abundance of natural resources depresses growth mainly because of the rent-seeking behaviour that characterizes economies that are heavily dependent on natural resources.

When the estimated equations are used to draw conclusions about Algeria, the results show that Algeria's bad record, in terms of openness and reliance on hydrocarbons exports, affected its per capita GDP growth adversely. It is, however, the absence of openness that harmed Algeria's growth record more over the period of study. Our calculations reveal that being not open to international trade cost Algeria more than twice what it cost it in terms of reliance on primary goods exports.

This work can be improved in many ways. First, the time sample can be extended to include recent observations. Second, a panel approach can be used to deal with many aspects such as the question of parameter heterogeneity. Third, the GMM method can also be employed to tackle problems related to variable endogeneity, for instance. Finally, a time series approach, although not widely used, can be employed to draw more interesting conclusions about a single, such as Algeria, in terms of growth record.

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Appendix

Tables

Table 1: Growth, Openness, and Primary Goods Exports in Algeria and
Comparators

Country/Group	Nb	PCGR	Nb	OP7092	Nb	SXP70
Algeria	1	1.19	1	0.00	1	0.19
Tunisia	1	2.50	1	0.17	1	0.10
Egypt	1	2.50	1	0.00	1	0.07
Venezuela	1	-1.59	1	0.13	1	0.24
Nigeria	1	61.48	1	0.00	1	0.14
Korea	1	5.81	1	1.00	1	0.02
MENA	5	2.44	6	0.14	9	0.24
Oil-Exporters	6	0.46	6	0.02	8	0.32
Developing Countries	70	1.11	67	0.18	72	0.17
Sample	95	1.47	90	0.37	97	0.15

Source : Calculations made by the author using data on the
variables defined below.

Table 2 : Regression Results

Vble / Eq.	1	2	3	4	5	6
C	-0.01 (-0.51)	-0.02 (-0.89)	-0.04 (-1.57)	-0.06 (-2.65)	-0.01 (-0.54)	-0.02 (-0.76)
LPCGDP70	-0.013 (-5.34)	-0.13 (-5.28)	-0.010 (-4.33)	-0.010 (-3.87)	-0.013 (-5.81)	-0.013 (-5.85)
LSEC70	0.0070 (2.72)	0.0076 (3.34)	0.0071 (2.83)	0.0090 (3.90)	0.0066 (2.90)	0.0071 (3.35)
LINV7000	0.040 (6.06)	0.034 (6.00)	0.043 (7.35)	0.041 (7.04)	0.040 (6.91)	0.038 (6.99)
GPOP	-0.21 (-0.92)		-0.43 (-1.92)		-0.12 (-0.53)	
OP7092	0.021 (4.61)	0.022 (5.04)			0.019 (4.26)	0.020 (4.72)
SXP70			-0.053 (-4.09)	-0.060 (-4.36)	-0.060 (-4.48)	-0.057 (-4.57)
N	86	86	87	87	83	83
$\overline{R}^2$	0.63	0.63	0.62	0.61	0.70	0.70
F	29.85 (0.000)	37.17 (0.000)	29.77 (0.000)	35.14 (0.000)	33.04 (0.000)	39.97 (0.000)
nr^2	16.47 (0.69)	10.74 (0.71)	14.12 (0.82)	13.18 (0.51)	15.80 (0.96)	13.76 (0.84)
W	7.94 (0.24)	8.19 (0.15)	8.49 (0.20)	11.32 (0.045)	13.84 (0.054)	12.47 (0.052)
$P\hat{C}GR$	1.66	1.68	2.34	2.43	1.54	1.54
$\hat{\beta}$	0.017	0.016	0.013	0.010	0.017	0.017
H.T	40.10	43.06	54.49	65.08	40.27	41.31

Notes :

Variables are described below.

Annual per capita GDP growth (PCGR) is the dependant variable.

Figures between brackets under the estimated coefficients are t-ratios, whereas those below F, nr^2, and W are p-values.

$P\hat{C}GR$ is fitted growth for Algeria.

$\hat{\beta}$ is the implied speed of convergence.

H.T. is the number of years necessary for an average economy to close the gap between its initial and steady-state position.

Table 3: Contributions to Fitted Growth for Algeria

Model	LPCGDP70	LSEC70	LINV7000	GPOP	OP7092	SX70
1	0,52	-0,76	1,54	-0,16	-0,78	
2	0,50	-0,86	1,50		-0,83	
3	0,41	-1,81	1,86	-0,32		-0,29
4	0,35	-1,03	1,80			-0,31
5	0,52	-0,75	1,65	-0,09	-0,70	-0,31
6	0,51	-0,80	1,62		-0,73	-0,31

Source: Calculations made by the author using the estimated regressions.

Variables Definition and Data Sources

PCGR: Real per capita GDP growth rate calculated as the difference between the natural logarithm of per capita real GDP in 2000 and the natural logarithm of per capita GDP in 1970 divided by 30. Source: PWT 6.1. The real per capita series corresponds to the series named rgdpl in the PWT 6.1 data base which stands for the Laspeyres real GDP per capita in 1996 international prices.

LPCGDP70: The logarithm of real per capita GDP in 1970 in 1996 international prices. Source: the PWT 6.1.

LSEC70: Natural logarithm of the gross secondary school enrolment in 1970. Source: WDI (2004)

LINV7000: The logarithm of average investment ratio at current local prices over the period 1970-00. Source: WDI (2004).

GPOP: The average growth rate of total population over the period 1970-00, calculated in the

same way as PCGR. Source: WDI (2004).

OP7092: The fraction of years during the period 1970-92 in which the country is rated an open economy according to the criteria in Sachs and Warner (1995a). Source: Sachs and Warner (1995a), "Economic Reform

and the Process of Global Integration," Brookings Papers on Economic Activity, 1, 1995, 1-95.

SXP70: The share of primary exports in GDP in 1970. Source: Sachs and Warner (1997b), "Sources of Slow Economic Growth in African Economies", Institute for International Development and Center for International Development, Harvard University.

List of Countries Used in the Study

Algeria, Argentina, Australia, Austria, Bangladesh, Barbados, Belgium, Belize, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo Dem. Rep. (Zaire), Congo Rep. (Congo), Costa Rica, Cote d'Ivoire, Denmark, Dominican Republic, Ecuador, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Finland, France, Gabon, Gambia, Georgia, Ghana, Greece, Guatemala, Guyana, Haiti, Honduras, Hong Kong, Hungry, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Korea Rep., Latvia, Lesotho, Liberia, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mexico, Morocco, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Portugal, Rwanda, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, South Africa, Spain, Sri Lanka, St. Vincent and the Grenadines, Sudan, Sweden, Switzerland, Syria, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zambia, Zimbabwe.