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INFRASTRUCTURE AND GROWTH IN MOROCCO: A NATIONAL ANALYSIS TOWARDS A REGIONAL ANALYSIS

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Public investment in infrastructure is more seen as a factor for improving productive performance and private sector investment. As such it contributes to growth by strengthening the supply side of the economy. It represents an important development issue. This shift is due in particular to the work of Aschauer (1989) showed that by estimating a production function expanded public capital's role in this slowdown in U.S. productivity from the 70s. On the basis of these results, the new growth models quickly took into account public expenditure as a gain factor of self-sustaining productivity and long-term growth (Barro, 1990). In this study, we will highlight, through the construction of empirical models, the impact of infrastructure investments (aggregated and disaggregated) on domestic production. The results of the study will show the need for a well-focused and oriented infrastructure sectors more productive and pave the way for comparative studies at a regional level. The empirical analysis of the effect of infrastructure investment on Moroccan production has been made on annual data spanning from 1980 to 2009. The model draws on the work of Aschauer and is built on the basis of a production function Cobb-Douglas. The analysis took into account real GDP as the exogenous inputs and added this function a usual infrastructure stock calculated on the basis of several indicators of physical infrastructure, social and financial. From this analysis, it appears that infrastructure investments have a positive and significant impact on economic growth in Morocco. The elasticity of output with respect to infrastructure stock is 3.2. The second result is obtained from the same function (Cobb-Douglas), but incorporating the three categories of infrastructure which are, social infrastructure, physical and economic infrastructure. It shows that the elasticity of output for different categories of infrastructure is not always positive. Most infrastructure generating economic growth is the economic infrastructure (with an elasticity of 3.2% of GDP). Then, very faintly, physical infrastructure (with an elasticity of 0.044% relative to GDP). And finally, with a negative elasticity, social infrastructure does not contribute to the economic growth in Morocco.
The third result concerns the direction of causality between economic growth and investment in infrastructure and shows that causality is bidirectional. Infrastructure investments promote economic growth and vice versa, strong economic growth would increase infrastructure investment initiatives.
In view of these results, the infrastructure is an area in which efforts still need to be made to give a boost to economic growth in Morocco. It recommends practical steps and measures to improve productivity of investment in infrastructure. It does not stop at this level as it aims to analyze the role of public infrastructure investment on growth regions of Morocco by answering to two main questions:

1 / Do infrastructure investments they have an effect on regional productivity?
2 / Can they participate in the reduction of interregional disparities?

Keywords: infrastructures, Cobb-Douglas, aggregate indicator, education, health, transport, energy, information and communication technologies, agriculture, financial sector.

JEL Classification: H54, H44, C23, C33, O47, R11

Introduction:

Public investment in infrastructure is more seen as a factor of improving productive performance and private sector investment. As such it contributes to growth by strengthening the supply side of the economy. This conclusion is due in particular to the work of Aschauer (1989) who showed that, by estimating a production function expanded public capital's role in this slowdown in U.S. productivity from the 70s.

The work of this author conclude a major contribution of public capital in the production and growth. This author estimates conducted series lead U.S. to retain the elasticity of private output with respect to public capital of around 39%, higher than that of private capital. Therefore, the productivity slowdown observed in the United States come mainly from the decrease in public investment efforts.

On the basis of these results, the new growth models quickly took into account public spending as a driver of economic growth self-sustaining productivity and long-term growth (Barro, 1990).

In this paper, it is first present an overview of the theoretical and empirical literature on the subject of the impact of public spending on infrastructure (aggregated and disaggregated) on economic growth.

In the second place, it will be highlighted through the construction of empirical models, the impact of infrastructure investments (aggregated and disaggregated) on domestic production. The results of the study will see the need for a well-focused and oriented infrastructure sectors more productive and pave the way for comparative studies at a regional level.

I- Theoretical And Empirical Studies Of The Relationship "Infrastructure - Economic Growth"

1. The impact of public spending on infrastructure on economic growth:

Some spending, including public investment in infrastructure, generate externalities that enhance the productivity of private factors and may thereby supporting economic growth (Blejer and Khan, 1984; Aschauer, 1989; Tanzi and Zee, 1997).

However, it was not until the development of new growth theories to reaffirm the role of public capital in economic dynamics (Barro, 1990).

In the Barro model, the economy is characterized by a production function incorporating private capital and public capital in the form of infrastructure. Public spending financed pure public goods in addition to private spending.

The public sector's contribution to economic growth occurs through the channel of public capital (infrastructure, education, transport, research and development, communication ...). Barro says the cumulative effect of infrastructure spending by the fact that they provide increased growth induces an increase in government revenue, source of growth. Public infrastructure is to the economist, a growth factor that generates increasing returns to scale in the long term because they allow internal savings for producers.

The existence of increasing returns to capital is well explained in terms of investment in infrastructure. Recent call first public policies that, during contraction or underproduction relative to

the potential of the economy, Keynesian impact in creating jobs and in exerting a positive cyclical. They reduce transaction costs and facilitate trade between and within borders. They allow economic actors to respond to new demands in new places. They lower the cost of inputs for the production of almost all goods and services. They make profitable unprofitable activities without them, and even more profitable existing activities. Theorists endogenous growth also recommend that these costs be maintained even in the face of difficult economic conditions.

These theoretical arguments have therefore revealed a strong link between investment in infrastructure and economic productivity.

However, it was not until the late 80s that economists began to develop quantitative measures of this link building macro-econometric models.

In 1989, David Aschauer caused considerable momentum for policy makers. He showed that the decline in U.S. productivity in the 1970s was largely related to lower rates of investment in public capital. His model is constructed from a production function (Cobb-Douglas, data log) whose factors are private capital, public capital and non-military employment, to which he adds a trend and utilization production capacity in order to take into account the cyclical changes. Indeed, Aschauer adds to the usual inputs production function variable (S) to measure capital reserves for public infrastructure (or public capital stock).

Using time series, it was possible to estimate the aggregate production function as follows:

$$Y = A K^{\alpha} L^{\beta} S^{\gamma} \qquad (1)$$

Where Y is the level of U.S. production of the private sector, K is the stock of private capital, L labor and capital stock S non-military public. This last variable includes all infrastructure spending (education, health, transport, water and electricity ...).

Some authors use a narrower definition of the variable S which is based, for example, only on roads. The variable S used here refers to spending on infrastructure in the broadest sense. The parameters A, α, β and γ are approximated using a conventional multiple regression technique. The functional form used in equation (1) corresponds to a production of Cobb-Douglas, which allows inputs to be substitutes in production. The parameters of equation (1) represent the elasticity of output with respect to different factors of production.

Many authors have attempted to determine the value of γ, ie the elasticity of output with respect to infrastructure stock, and arrive at different results.

These values vary mainly for the following reasons:

- The geographical definition of the data used for the estimate;
- Econometric technique chosen to reflect the timing of the data and
- The definition of the stock of public infrastructure.

Munnell (1990) also uses aggregate time series data and a Cobb-Douglas and also assumes constant returns to scale in all inputs, but instead the ratio of production / private capital, it uses the productivity work (that is to say the ratio of production / work) as the dependent variable. It confirms the results of Aschauer that public capital plays an important role in the production. However, the likelihood and severity of Aschauer results and related studies have been a large number of critical works.

A first criticism concerned the non-stationarity of the series entering into the production function (Tatom, 1991a and 1993a). One solution adopted by several authors was then to conduct estimates in first differences. Tatom (1991a), Hulten and Schwab (1991a), Sturm and De Haan (1994), Ford and Poret (1991) in particular - always on time series - and call into question the results of Aschauer. Their estimates are, however, not much more convincing. Their results are indeed very sensitive to specifications adopted - the production function or aggregate public capital in particular - and the elasticities of other factors of production are far from satisfactory.

In addition, as pointed out by Munnell (1992), there is no reason to prefer the estimates in first differences, to the extent that this process erases the possible long-term relationship between public capital and private production. Ideally, this long-term relationship should be estimated by cointegration techniques.

A second set of criticisms affects the possible endogeneity of the variable "infrastructure." According to Wagner's law, the economic development and growth are causing an increase in government spending. This increase would, in particular, due to increased demand for public services and the greater financial resources of the Government. There would thus reverse causality or a double causality between infrastructure and growth, which would result in simultaneity bias in the estimation of the production function expanded.

Several authors have attempted to answer the question of the endogeneity of expenditure and public investment in works most often in panel data. The thesis of reverse causation is validated by Ahsan, Kwan and Sahni (1989 and 1992), Tatom (1993a) for the United States and Conte and Darrat (1988) for a sample of 10 OECD countries. The indicator tested - namely aggregate public spending - can nevertheless be regarded as a satisfactory proxy infrastructure. More convincingly, and Forgaty Eberts (1987) show a bidirectional causality between public investment and growth. As well as top and Herrera (1996), who arrive at the same conclusion for a sample of 28 developing countries and introducing an aggregate public capital. For their part, Holtz-Eakin and Schwartz (1995) show for the U.S. unambiguous causality of road infrastructure on growth.

The possible endogeneity of public investment requires the implementation of appropriate econometric techniques. Of least-squares estimates instrumenting the variable "infrastructure" have produced mixed results. Following Aschauer (1989c) - which had verified so robustness of its estimates - Duffy-Deno and Eberts (1989) find an elasticity of public capital of 0.08 for the United States (an increase of 1% public capital would increase output by 0.08%). In the context of panel data estimates - always for the United States - Fay (1993) validates the positive impact of electricity infrastructure, Canning and Fay (1993) that transport. Garcia-Mila et al (1996) reported the role of roads and sanitation and Evan and Karras (1994) education. For their part, Nagaraj, and Varoudakis Véganzonès (2000) show the robustness of their least-squares estimates for an aggregate indicator of physical infrastructure, social and economic, in the case of the governments of India.
In contrast, the use - backed by Holtz-Eakin (1994) - instrumental variables under various econometric techniques to the American Governments, is disappearing positive impact estimates obtained for the variable level of public capital.

The effect of infrastructure on economic growth can be analyzed at an aggregate level (reflected in the work of several authors construct an aggregate indicator of infrastructure (Véganzonès ...)) or at a disaggregated level (physical infrastructure, social and economic).
The following section will analyze how each category of infrastructure could (according to the theory and empirical studies) contribute to the economic growth of a country.

2. The effects of each category of infrastructure on economic growth:

In 1965, Hansen was the first to propose an accurate classification infrastructure. It distinguishes between "social infrastructure", whose function is to maintain and develop human capital (ie education and social services and health) and "physical infrastructure" involved in the production process (including roads, highways, bridges, railways ...).

These two categories of infrastructure, there are the economic infrastructure (including financial infrastructure), which reflect the particular importance of financial system development efforts and growth in different economies.

The importance that the Government has long been the leading provider of infrastructure services. However, during the last two decades, we witnessed a global movement towards deregulation and privatization of public investment.

Regardless of the speaker, infrastructure plays a significant role in the development of any country, as it is to provide the essential services that people need to enjoy the basic conditions of life. How each of these categories of infrastructure facilitates, in the literature, economic growth?

Regarding social infrastructure, they include educational infrastructure and social services and health infrastructure.

Economists have analyzed the effects of educational infrastructure on economic growth, show the existence of strong links between investment to better adapt to the needs of local education and improving student achievement. Studies show that these investments will in the future economic benefits subsequent to the entire community through the expected increase in future earnings. In addition, an increase in spending on educational infrastructure results in an increase in GDP.

Its part, the World Bank argues that investments in school infrastructure and social contributed to the reduction of overstaffing, the improvement of hygiene and safety in schools, access to primary health care and, to a lesser extent, access to productive resources. These investments have created conditions conducive to quality teaching and competed in the formation of human capital, determinant of economic prosperity, full employment and social cohesion. Regarding the rehabilitation and equipping of schools outside the university, the removal of material risk to the occupants of damaged schools, lower costs for utilities and maintenance and contribution to the poverty reduction are just some of the benefits of specific investments related to rehabilitation. However, these results contrast with those obtained in most developing countries. Studies show that the government should invest more in the construction of schools in rural areas to ensure access for all to education and health, rather than investing in targeted programs more expensive, which not benefit the poor. They emphasize that the coherence and coordination must be an absolute necessity to avoid build schools that remain without teachers and clinics that cannot be supplied with drugs.

For studies examining the relationship between health and growth, they indicate that the development of hospitals has reduced infant mortality resulting in increased life expectancy of the population.

There are significant studies that suggest that the health status of individuals is a key factor in productivity. One of the obstacles to the development of adult productivity in Africa is their poor health generally due to lack of preliminary care.

According to several authors, at least one third of the productivity gains in Western Europe in recent centuries is attributable to the improvement of health and nutrition through services rendered to individuals.

However, despite the importance of externalities related to the development of social infrastructure, this factor does not show a lot of attention in the modeling. Only a few authors have attempted to do this by using indicators such as the average number of years of education of the population and infant mortality that are more specific variables of human capital.

The financial system, representing the economic infrastructure is of particular importance in the development efforts and growth for various economies of the world, regardless of their geographic location, degree of industrialization and the time frame. It is a fact that many economists agree to accept, based on both theoretical and empirical studies.

Since the 18th century, the role of banks in facilitating commercial business was highlighted by Adam Smith in 1776, which governments that the banking industry can develop a country. "Any increase or decrease in the amount of capital naturally tends to increase or decrease the amount actually in the industry, the number of productive people, and consequently the exchangeable value of the annual produce of the land and labor of the country, the wealth and real income of all its inhabitants. " Other authors, namely Schumpeter (1912), emphasize the role of bankers who, by targeting and funding entrepreneurs, encourage technological innovation, capital accumulation and thus stimulate the economic growth. Thus, financial development stimulates growth through increasing the rate of investment and through the allocation of capital to the most productive.

After the 1929 crisis, Keynes explains that through the interest rate, the financial system can contribute to economic growth. It shows that increasing the money supply in an economy, there will be a decline in interest rates, which encourage investors, has a direct impact on employment, production, and therefore the development and growth of the economy. Based on this idea, the economies of the world have tried, since the publication of "The General Theory of Employment, Interest and Money, John Maynard Keynes, 1936," to take advantage of the potential that is financial system, trying to find the best steps to optimize its use in development efforts.

As for physical infrastructure, they play a dual role in development: first as a factor of production by reducing costs and increasing the level of infrastructure services offered, then as basic services some of which are considered fundamentals.

They can be grouped into four areas: transportation, ICT (Information and Communications), energy and agriculture.

Transport infrastructure "primary" advantages are: reductions in transportation costs, improvements in accessibility (shorter travel time, avoid isolation and marginalization) and increases throughput (volume of traffic). In addition to these benefits as improved safety, reduced emissions or enhancing the inter-modality.

Indirect benefits are formed by the externalities of the transport system in other markets. These externalities are the primary link between benefits and economic growth. These are the real arguments in favor of the hypothesis of endogenous growth supported by transport infrastructure. The level of these externalities, as well as their distribution in time and space, will affect the extent of economic growth.

Thereby improving the transport system contributes to economic development by increasing the size (and efficiency) of the labor market.

From the point of view of markets for goods and services, the advantage is twofold. Within the same company, geographical proximity allows an improvement of the production process: Strategies for lean, gains on storage, economies of scale ... It also opens up options for strategic focus, concentration, partnership ... But above all, intensification of competition, however imperfect, may be sufficient to break monopolies and to end monopolistic behavior.
About the macroeconomic effects of ICT infrastructure, some developing countries consider that mass adoption of these may allow catching "fast track" countries. ICT could be the cause of a change in their growth and better integration into the international division of labor. The emergence of new technologies may indeed allow the opening of "windows" of re-specialization for countries with low levels of development. New opportunities can be seized as evidenced by the opening of China in the computer industry and India in software.

Several countries have undertaken significant reforms to facilitate the diffusion of ICT in the economy. The multilateral institutions of development seem to strongly support these policies.

For his part, agricultural development has significant potential to contribute to poverty reduction at the national level, through direct effects on farm incomes and employment and indirect effects on overall economic growth, as well as its impact on food prices.

Indeed, the first development literature considered in the economic development of agriculture had a role in supporting industries - ensuring a supply of cheap food for workers in industrial sectors (Lewis 1954). Since the 1960s, a more active role of agriculture as a driving force for global economic growth has been recognized and emphasized (Johnston and Mellor 1961, Schultz 1964, Mellor 1966). Much of the agriculture of subsistence and semi-subsistence has been achieved through the adoption of a new technology, investment in infrastructure and rural markets and the design and implementation of appropriate policies.

This change has increased the productivity of land and labor, an increase in income of farmers and farm workers, and improved purchasing power of consumers. Low prices of food made possible by unit costs lower production contributed to lower wages in non-agricultural sectors while facilitating industrial growth. Agricultural growth contributes to economic activity via the inputs, processing, distribution and storage industry, producing multiplier effects beyond agriculture. In addition, higher farm incomes induce a rise in demand for the goods and services produced in other areas (Hazell and Röell 1983).

Several processes are required for rapid growth of food production and the economy of a comprehensive rural poor. Technology, infrastructure and market interventions contribute to pro-poor agricultural growth at every stage of development. Basic interventions (such as infrastructure) provide better conditions for intensive production technologies. Finally, the analysis of the relationship between energy consumption and economic growth is more and more important as the main sources of potential energies are running out.

For Percebois (2000) the energy content of the inner wealth of a country is mainly influenced by variables related to the structure of production, technology and infrastructure used, climate, regulations and pricing Director of energy.

Many energy economists conclude that the energy consumption and GDP grow at the same pace following the law called "the unitary elasticity." Beyond the elasticity with respect to GDP, the link

between energy consumption and economic growth was apprehended through production functions (KLEM) integrating energy as a production factor and this for good and simply because it is never consumed itself, but as a means to operate equipment capable of satisfying a need. KLEM functions have attracted much theoretical interpretations and empirical tests by economists during the decade (1970 - 1980) leads to two conclusions, the first advocates strict complementarity between the different factors, while the second allows substitutability partial or quasi-perfect factors (Percebois 1989).

It is clear that understanding the mechanisms of substitution between energy and other factors of production is necessary to analyze the dynamics of energy intensity or total energy demand of an economy, but it is also important to consider the effects of substitutions due to the scarcity of other forms of energy, the influence of relative prices and the increasing globalization of trade. Empirically, many economists have tried following the second oil shock, to quantify the influence of energy variables on macroeconomic indicators. Kraft and Kraft (1978), in an analysis of the U.S. economy between 1947 and 1974, were the first to demonstrate the existence of a unidirectional causality that shows that in the USA, the national product causing gross energy consumption. This relationship suggests that it is possible to consider policies saving energy without negative effects on economic growth.

Ii-Testing For The Effect Of Infrastructure Investments (Aggregated And Disaggregated) On Domestic Production:

1. Objectives and estimation of models:

To measure the impact of infrastructure investment on output in Morocco, we set three goals:
- The first objective is to analyze the impact of infrastructure investment on domestic production from the Cobb-Douglas follows:

$$Y_t = A\, K^{\alpha}_t L^{\beta}_t S^{\lambda}_t$$

The estimate of the function will determine the output elasticities with respect to different factors (especially the stock of infrastructure).

- The second objective is to study the comparative advantages of different types of infrastructure to promote national production from the same model but incorporating the following three categories of infrastructure:

Social infrastructure: including "education" and "health" are grouped in the indicator (composite) S1;

Physical infrastructure: including the areas of "transport", "ICT" of "energy" and "agriculture" are summarized in the indicator (composite) and S2;

Economic infrastructure: including the "Financial" are represented by S3.
Elasticities of output with respect to each variable will determine the category of most infrastructure generating economic growth in Morocco.

- The final goal is to determine the direction of causality between infrastructure investment and economic growth in Morocco through the test of Granger causality.

To achieve the first objective (to measure the impact of infrastructure investment on domestic production), we will estimate the Cobb-Douglas follows:

$Y_t = A K^{\alpha}_t L^{\beta}_t S^{\lambda}_t$ with A, K, L, S are positive.
0 <α <1, 0 <β <1, 0 <δ <1 and 0 <λ <1 and α + β + δ + λ = 1 (yields are constant).
α, β, δ and λ are parameters representing elasticities of output with respect to different factors. Elements of our function are defined as follows:

- Technical progress "A" (measured by TFP: Total Factor Productivity):
We will calculate TFP by the method of growth accounting. Various empirical studies that measure the through this method, based on Solow (1957) which makes the effect of productivity on economic growth through a neoclassical production function Cobb-Douglas returns to scale constant and in the context of a market situation of perfect competition. Economic growth depends on physical capital and exogenous technical progress.

Solow estimated factor productivity residual in a way, considering the technical progress as Hicks neutral, and constant returns to scale.

- The stock of physical capital "K"
It is calculated using the perpetual inventory method traced by Van Pottelsberghe (1996). Thus, the stock of physical capital "K" in year "t" is equal to its stock in "t-1" adjusted depreciation rate δ investment plus "I" at time t:

$$K_t = K_{t-1} - \delta K_{t-1} + I_t \text{ or } K_t = I_t + (1 - \delta) K_{t-1}$$

Where I is the gross formation of fixed capital (GFCF) and the rate of capital depreciation (δ) is 5%. The latter is assumed to be constant over time and identical for all countries (Hamilton, 2006).
The initial stock of physical capital K0 is equal to the initial investment I0 g divided by the sum of the annual growth rate of investment It and the depreciation rate of physical capital δ: $K_0 = I_0 / (g + \delta)$
g: it is the sum of the annual growth rate of "d_t" investment (GFCF) in year t.
We can write :

$$d_t = (FBCF_t - FBCF_{t-1}) / FBCF_{t-1}$$

- Labor "L":
This variable describes the amount of effort by employees in the production process and for which they are hired and paid.
In our model, it will be quantified by the number of employees contributing directly or indirectly in the production process that is to say the working population.

- Infrastructure stock "S":
Public spending on infrastructure is not a satisfactory proxy infrastructure (considering the fact that the private sector involved in more investments either directly or through concessions). This is why we will build an aggregate index of infrastructure calculated as a weighted average of the principal components of various indicators of basic infrastructure. This method overcomes the multicollinearity problems associated with the presence of a large number of indicators potentially collinear.

"S" represents therefore the composite indicator of basic infrastructure.
The methodology for constructing the composite indicator has five basic steps:

Step 1: Selection of relevant indicators
The variables representing each infrastructure sector are the following:
∗ **Education sector** (represented by the number of public primary schools) and;
∗ **Health sector** (represented by the number of hospital beds per 100,000 people).
These two sectors (education and health) represent the social infrastructure.

∗ **Energy sector**: Generally, two main indicators are used to capture energy infrastructure: the production or total consumption of electrical energy as a quantitative indicator and electrical energy losses as an indicator of quality. However, it is very difficult to assess the impact of production losses on the economy because it fails or to households or businesses. With regard to production, it does not reflect consumer needs. For this reason, we use the electrical energy consumption as an indicator of the energy infrastructure.

∗ **Transportation sector** which includes both:
- **Road** transport represented by the length of roads built and coated km;
- **Rail**: represented by length of the rail network in km per 1000 sq. km;
For sea and air transport, the choice of the number of ports and airports is not very relevant because of the stability of these variables over time. It was thought to choose the number of vessels in and out of all ports and aircraft movements on all airports, which are available but which do not really reflect the infrastructure built in these areas. So we eliminated these two areas that seem insignificant.

∗ **Communication sector** (represented by fixed telephone subscribers, mobile and Internet per 100 inhabitants).

∗ **Agriculture sector** (represented by the irrigated area in thousands of HA).
The four sectors (energy, transport, agriculture and ICT) represent the physical infrastructure.

∗ **Banking sector** (represented by the number of branches) and represents the economic infrastructure.

The series are annual and range from 1980 to 2009. Their main sources are the Haut Commissariat au Plan and World Bank data.

Step 2: The normalization (or standardization) of sub-indicators if the units of measurement are very different:
To normalize our data, we choose the method "or Z-score normalization" seems to be the most suited to the nature of the available data.

Step 3: Weighting and aggregation of indicators:
The weights must always be explicitly described and justified. In our case, the weights of the sub-indicators will be shares of value added sector in total value added sectors.

The composite indicator of infrastructure will be the sum of the standardized indicators weighted by their coefficients (share of value added). This is the infrastructure stock "S" presented in the appendices.

After defining the variables, we move to estimate our model based on a production function Cobb-Douglas.

To estimate this function, through three key steps:

The transformation of variables = 100;

Linearization (or stationnarisation) by the introduction of the log and;
The estimation of the equation by OLS (Ordinary Least Squares) to obtain a linear unbiased estimator and minimum variance.

By integrating the previously defined variables, and following these steps, we obtain the following results:

Sample: 1980 2009
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LK	0.459454	0.042234	10.87876	0.0000
LL	-0.036636	0.131929	-0.277695	0.7834
LS	0.032799	0.009165	3.578828	0.0014
C	2.459754	0.393872	6.245065	0.0000

R-squared	0.990426	Mean dependent var	5.182212
Adjusted R-squared	0.989321	S.D. dependent var	0.346527
S.E. of regression	0.035810	Akaike info criterion	-3.697611
Sum squared resid	0.033341	Schwarz criterion	-3.510785
Log likelihood	59.46417	F-statistic	896.5270
Durbin-Watson stat	1.430431	Prob(F-statistic)	0.000000

The model is highly significant because one gets adjusted R ² equal to 98%. The result shows that the fat elasticity of output with respect to infrastructure stock is 0032. This means that a 1% increase in the stock of infrastructure increase the production of 0.032%. Increase appears to be quite important for the Moroccan economy.

The second model to study the comparative advantages of the 3 categories of infrastructure S1: Social Infrastructure, S2 and S3 Physical Infrastructure: Economic infrastructure is written in the following form:

$$Y_t = A\, K^{\alpha 1}{}_t\, L^{\alpha 2}{}_t\, S^{\alpha 3}{}_{1t}\, S^{\alpha 4}{}_{2t}\, S^{\alpha 5}{}_{3t}$$

The model results are as follows:

Sample: 1980 2009
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LK	0.453698	0.041528	10.92523	0.0000
LL	-0.021145	0.128341	-0.164758	0.8705
LS1	0.000444	0.006347	0.069933	0.9448
LS2	-0.005154	0.007315	-0.704581	0.4879
LS3	0.032595	0.008946	3.643510	0.0013
C	2.429659	0.388400	6.255566	0.0000

R-squared	0.991576	Mean dependent var	5.182212
Adjusted R-squared	0.989821	S.D. dependent var	0.346527
S.E. of regression	0.034961	Akaike info criterion	-3.692330
Sum squared resid	0.029334	Schwarz criterion	-3.412091
Log likelihood	61.38495	F-statistic	565.0270
Durbin-Watson stat	2.093589	Prob(F-statistic)	0.000000

The results show that most infrastructure generating economic growth are the economic infrastructure (with an elasticity of 0.032% relative to GDP). Then followed by very low physical infrastructure (with an elasticity of 0.00044% relative to GDP). And finally, a negative elasticity for

social infrastructure that negatively influence economic growth in Morocco. These results seem very adapted to the Moroccan context. Especially since the primary has a low impact on economic growth as not involved in the formation of skilled labor.

The third objective, to determine the direction of causality between the stock of infrastructure and production through the method of Granger (with a delay of 2), leads to the following results:

Sample: 1980 2009
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
S does not Granger Cause Y	28	3.15390	0.06160
Y does not Granger Cause S		8.37183	0.00185

We note that the causality is bidirectional threshold of 10%. Infrastructure investments promote economic growth and vice versa, strong economic growth would increase infrastructure investment initiatives.

2 - Critical analysis of the current situation:
Convinced that the country cannot be attractive and attract massive foreign investment structures without modern communication, Morocco has embarked on the modernization of its infrastructure: inauguration two years the Rabat tramway, accelerating the work of Casablanca tramway , opening of Fez-Oujda motorway and Marrakech-Agadir launch TGV works that dedicates the development of railways, the Tangier-Med project, planning, proliferation of dams ...
To the motorway network, Morocco is committed to connecting all its major cities, more than 400 000 inhabitants. Thus, 300 km in 1999, the motorway network has exceeded 1480 km (five times) in a decade. The network will Agadir (south) to Tetouan (north) by rallying the key cities of Rabat, Casablanca, Marrakech, Fez, Meknes, Tangier ... The highway program required a budget of 36 billion dirhams, 27.8 billion dirhams committed between 2008 and 2012. The goal is to achieve 1804 km of motorway in 2015 (include axis El Jadida-Safi 140 km Fès-axis Tetouan 252 km, highway-Berrechid of Beni Mellal 172 km).

For rail, Morocco launched in September 2011, a major project that is the TGV. The latter part of the development of the railway network of 1500 km by 2035, around paths Casablanca-Oujda and Tangier, Agadir. Expected to be operational in 2015, the TGV Tangier Agadir will carry 6 million people per year less than half of the current term. The TGV project promises a positive impact on the economy in general, and the national tourist activity in particular.

Another new project which is the public transport tramway in Rabat, which already operates two long lines of 19.5 km requiring a total cost of 3.1 billion dirhams. Two lines also, the Casablanca tramway runs for 30 km at an estimated cost of 6.4 billion and carry 250,000 people per day.

In the port area, the Tangier-Med project II-in progress-term promise to the port complex one of the most important platforms for containers in the Mediterranean. The first tranche will be delivered in 2014 and the second in 2016. To achieve this goal, the government and its partners have implemented an investment program. Thus, 120 billion dirhams have been invested from 2008 to 2012 is double the investment for the period 2003-2007 and four times the amount injected between 1998 and 2002. The Tangier-Med project integrates other airport projects, highways, expressways and railways, to make this region an economic attracting investors leading industrialists.

On agriculture, given its economic determinant of growth in Morocco but also because of social issues and sustainable development of the country, it is considered as a priority sector in economic and social policy of Morocco.

It is in this context that in April 2008 a new agricultural strategy, known as the Green Morocco Plan was developed.

The Green Morocco Plan aims to adopt a modern approach to contribute to the promotion of investment in agriculture and build on successful experiences in the field, both nationally and internationally. Also, he is to develop small-scale agriculture as a supportive approach directed towards the fight against poverty by significantly increasing the agricultural income of the most vulnerable, thanks to a new wave of social investment. The implementation of the Green Morocco Plan should lead to an increase in GDP of Morocco from 8 to 11.7 billion in 10-15 years.

In addition, the Green Morocco Plan places the water among the most important cross-cutting reforms which must provide the conditions for its successful implementation. The main issues and questions defined for water translate to the irrigation sector through the implementation of three major programs recently approved by the Department of Agriculture, namely the National Program on Water Saving irrigation program resorption gap between irrigation schemes and dams built and institutional reform of large-scale irrigation.

On energy, the government launched a new strategy for the development of the national energy sector. This strategy is divided into short-, medium and long term divided by the energy sector namely electricity, renewable energy and petroleum products, while focusing on energy efficiency. In the short term, a National Plan of Priority Actions (PNAP) was established in July 2008.

This plan aims to achieve a balance between supply and demand over the period 2008 - 2012, acting on the one hand, the capacity of production and, secondly, on the rationalization of the use of energy. Several actions and programs are running to reach the goal of 3,500 MW of additional electric power installed and 22 million lamps LBC distributed. Two new power plants Jorf Lasfar a capacity of 350 MW each were conducted for a total cost of 10 billion dirhams. Both units are extensions of the central Jorf Lasfar to increase the capacity of 2060 MW complex.

In the medium term, the strategy is the development of clean coal as the main source for the production of base and gas royalties for the tip, while exploring options to extend the Maghreb-Europe gas pipeline and liquefied natural gas. It also provides for the development of wind and the decoupling of hydro-electric development of the basins and the construction of Station Energy Transfer by Pumping (STEP) of 400 MW every 7-8 years. Along with this, it is also expected to enhance electricity interconnections with gradual transfer of structural dependence of interconnections to a source of economic arbitration.

In the long term, the strategy includes the development of technologies in 2025, the development of oil shale with the construction of a pilot plant of 100 MW and electricity production from organic waste. In addition, the investment required for the deployment of this strategy are estimated at 92 billion dirhams over the period 2008-2020 funded by the public sector, local or foreign private under concessional production as well as the domestic banking sector.

For ICT, Morocco adopted in 2001, the e-Morocco plan which aims to reduce the digital divide through the generalization of telecom infrastructure, equitable access to services of the knowledge economy and the emergence administration of digital proximity.

The Government has also signed a contract progress 2006-2012 which aims to increase the turnover of the sector to around 60 billion dirhams in 2012 and create more than 33,000 jobs. This vision seeks to integrate ICT to nearly 50,000 by 2012 companies to improve their competitiveness and to benefit 1.8 million Internet subscribers by 2012. In this same vein, a fund designed to facilitate companies to access funding for innovative projects was created. It has a capital of 100 million dirhams. Similarly, the Government is committed to increase the share of the government budget dedicated to IT 1 to 2%.

In the same vein, a new national strategy for the information society and digital economy 2009-2013 called "Morocco Numeric 2013" has been launched in October 2009. With a budget of 5.2 billion dirhams, this strategy will allow the sector to generate a GDP of 27 billion dirhams, of which 20 billion additional indirect GDP and create 26,000 jobs within five years. It aims at the development of the information society through four strategic areas:

• The development of the use of ICT across the curriculum "Injaz" allowing 80,000 engineers and related professionals to acquire a laptop with an internet connection subsidized nearly 85% by the Government, the "GENIE" to the generalization of equipping public schools through ICT, as well as the program of community access centers providing access to telecommunications services for remote communities.

• The development of e-Government, through the launch of 89 projects of convenient online services to citizens.

• The computerization of SMEs, especially those operating in sectors with high stakes of GDP, putting in place a subsidy for the purchase of automation solutions sector amounting to nearly 60% of the IT investment.

• The development of the local ICT sector by fostering the emergence of centers of excellence with high export potential. Will be discussed to develop financing solutions dedicated to IT type seed fund risk, childcare and regional technology support services for export and a regulatory framework for research and innovation.

For the education sector, since the entry into force of the National Charter of Education and Training 2001, preschool education has recorded appreciable progress. The number of children enrolled in preschool has reached a specific enrollment rate of 63.8% nationally. The situation in rural areas is a slight improvement (38.3% in 2000-2001 and 42.5% in 2008-2009).

The total enrollment of 6-11 years has reached a very high level (91.4% in 2008-2009). Difficulties continue to educate the remaining percentage of the school population. It is in fact children who do not have the financial and physical means to study.

These developments have necessitated the implementation of physical projects important as the total number of institutions of public primary education in 2008-2009 reached nearly 7,054 schools and 13,401 satellite schools against 6213 schools in 2000-2001, registering a growth annual average of 1.4%.

Despite progress, some indicators remain a concern. The repetition rate in 2008-2009 amounted to an average of 12.3% for the entire primary, 15.2% secondary college and 19.2% for secondary qualifying, with peaks more than 28.4% for the third year of the colege. The rate of abandonment, he recorded an average of 4.6% for all primary, 13.1% in secondary college

and 14.1% qualifying secondary. Among the reasons for the high dropout rate, we find that household poverty does not allow them to support their children's school and low educational quality and logistics education, especially in rural areas (lack teaching materials, inadequate structures, classes congestion, poor road network and public transport in rural areas ...).

On the progress made by governments to improve the health of populations, they have experienced a significant improvement in recent years as the number of Institutions Health Care Base (ESSB) increased by an average of 2% per year during the period 2001-2007 to $ 2,592 in 2007. Therefore, the number of inhabitants per ESSB dropped 12,429 people from 2001 to 9073 in 2007. Regarding hospital capacity, it should be noted an increase in the bed capacity of About 7% across all sectors. By cons, serving residents per bed has declined 6% to $ 919 in 2006. The public sector continues to dominate the hospital services available with over 78% of the total bed capacity, showed the same trends.

These achievements, shortcomings persist despite acted favorably on indicators of mortality and life expectancy at birth. The latter has reached 72.6 years in 2008 (71.4 years for men and 73.9 years for women) up 2.6 percentage points compared to 2001 (70 years).

As the financial sector, the process of financial deepening of the economy has accelerated, thanks to reforms in recent years, and the consolidation of financial stability has continued with the convergence of sector standards banking to international standards.

As a result, the financial sector has contributed significantly to the performance of our country, first as an economic agent whose value is growing, and then as a sideman with the momentum of consumption and investment as evidenced by the continued expansion of credit to the economy despite the slowdown in 2008.

Its resistance to the current crisis and the continuous improvement of indicators of strength and activity of the banking system can only strengthen government policy choices in the area and encourage them to persevere in the process of convergence to international standards the legal, institutional and regulatory framework governing the sector. However, the consolidation of its role in the process of capital accumulation and productivity growth is the continuation of reforms in the direction of a better combination between the funding of financial markets and banking intermediation. In fact, the financing needs expressed at different sectoral strategies recently implemented by the government (green, Emergence II, energy ...), reflect the effort required to build the economy.

In this sense, the scope for improving the financial market for corporate financing and mobilizing long-term savings remain important and need to make more operational alternative financing mechanisms and innovative is the urgency.

Aggregate indicators of financial sector show sustained development of the main activities of this sector. According to data from the national accounts, the account of the institutional agent "financial corporation’s" shows that the value added in volume of financial intermediation sector and insurance recorded an average annual growth of 8.6% between 2004 and 2008, evolution remains largely higher than the total value added (4.5%).

The share of the financial sector in total value added of the economy has increased significantly in recent years, from 5.4% in 1998 to 6.3% in 2008.

Conclusion

In the last decade, the question of the role of productive public capital has been a renewed interest particularly marked. Effects of public capital on the productivity and growth have been brought up to date, on the one hand, by growth theorists and, secondly, by empirical studies.

While Barro (1990) developed the endogenous growth model with productive public spending, Ashauer (1989) was the source of considerable controversy on the productivity of public capital and its measures. Empirical studies are also quite quickly turned to a spatial scale finer observation, from the national to the regional level, not only to increase the number of observations available, but also because of the political organization of territory.

The empirical analysis of the effect of infrastructure investment on Moroccan production has been made on annual data spanning from 1980 to 2009. The model draws on the work of Aschauer and is built on the basis of a production function Cobb-Douglas. The analysis took into account real GDP as the exogenous inputs and added this function a usual infrastructure stock calculated on the basis of several indicators of physical infrastructure, social and financial. From this analysis, it appears that infrastructure investments have a positive and significant impact on economic growth in Morocco. The elasticity of output with respect to infrastructure stock is 3.2.

The second result is obtained from the same Cobb-Douglas function, including 3 categories of infrastructure is, social infrastructure, physical and economic. The model concluded that the elasticity of output with respect to different categories of infrastructure is not always positive. Most infrastructure generating economic growth are the economic infrastructure (with an elasticity of 0.032% relative to GDP). Then followed by very low physical infrastructure (with an elasticity of 0.00044% relative to GDP). And finally, a negative elasticity for social infrastructure that negatively influence economic growth in Morocco.

The third result concerns the direction of causality between economic growth and investment in infrastructure and shows that causality is bidirectional. Infrastructure investments promote economic growth and vice versa, strong economic growth would increase infrastructure investment initiatives.

In view of these results, the infrastructure is an area in which efforts still need to be made to give a boost to economic growth in Morocco.

It recommends practical steps and measures to improve productivity of investment in infrastructure. It does not stop at this level as it aims, in thesis, to analyze the role of public infrastructure investment on growth regions of Morocco by answering two main questions:

1 / infrastructure investments they have an effect on regional productivity?
2 / Can they participate in the reduction of interregional disparities?

The importance of an assessment of the contribution of public capital to regional growth is twofold: This fits in the macroeconomic debate on the productive effects of public capital, in line with the endogenous growth models and empirical literature, but it also concerns the question of the capacity of public capital investments to reduce regional disparities.

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